plastics world

June 1972

PLASTICS ECOLOGY

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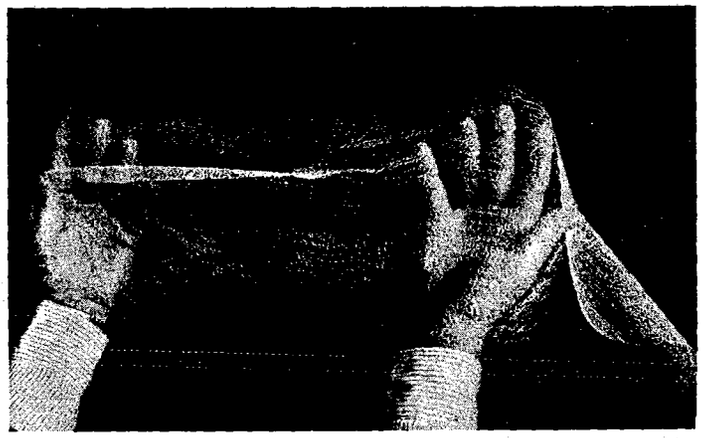

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CIRCLE 2

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CIRCLE 3

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plastics world
June 1971
Vol. 29/No. 6

cover

The massive message on this month's cover signifies the size of the problem that now confronts the plastics industry. The many complexities of "Plastics & Ecology" are detailed in the special report starting on p. 41.

5 plastistics
Facts, figures and economic indicators

10 plastics world
What's new in the industry

23 plastics management
Ideas for decision-makers

27 plastics design
Ideas from the design board

31 plastics output
Ideas for production men

special report

PLASTICS & ECOLOGY

41 Where do we stand—ecologically?
PW's comprehensive overview spells out the magnitude of the plastics industry's first major crisis—reaction of critics and consumers, legislative pressures, solid-waste facts, disposal methods, scrap reclamation, suggestions for a standards program and a Plastics Recycling Institute, and a plea for money, manpower and positive action.

49 Life cycle of plastics materials
Removable wall chart, a PW exclusive designed for this report, traces the origin, uses and disposal of major plastics; explains plastics industry efforts to control industrial pollution; identifies ecological action opportunities.

67 What should be done—technologically?
Plastics-disposal technology is building rapidly as part of a total solid-waste system. But the urgent need now is for coordinated technology transfer—similar to NASA's Technology Utilization program—to avoid overlapping R&D.

75 What action must we take—immediately?
For both economic and ethical reasons, everyone must take action now! PW suggests eight specific action steps and rounds up a databank of information sources, action options and literature that pertains to plastics and ecology.

84 new machinery
95 new materials
106 new literature
114 educational services
123 advertisers' index
124 last word
Let's make recycling honest!

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PW

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Northern Natural Gas Company

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CIRCLE 4

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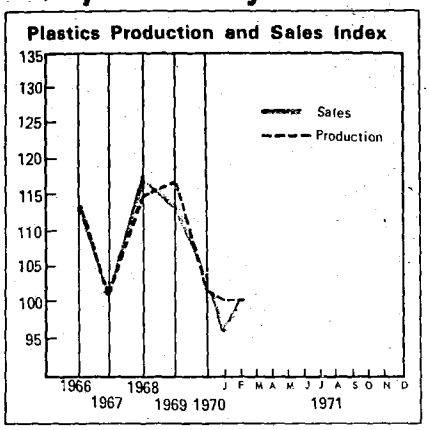
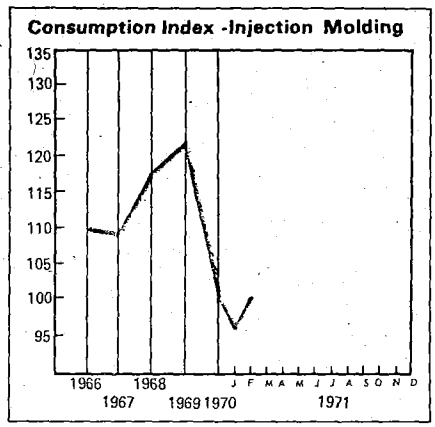
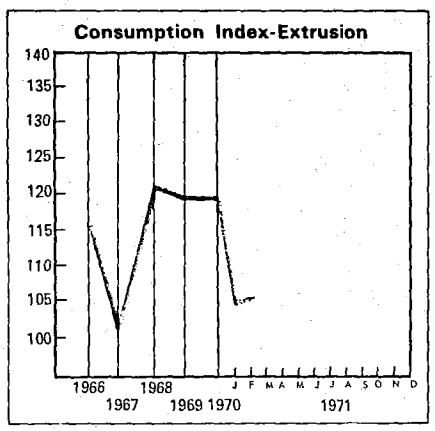
plastistics
facts, figures and economic indicators

Sharp recovery not indicated



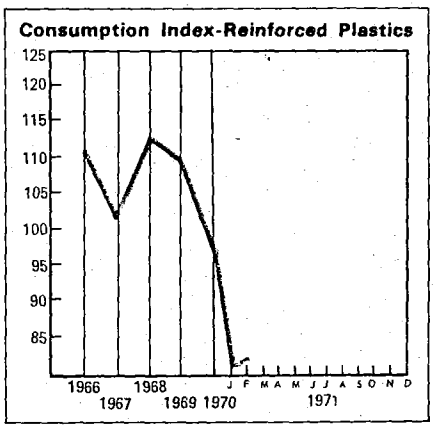




The first 2 months of U.S. Tariff Commission data on plastics production and sales for 1971 indicate no signs of a sharp recovery in plastics industry activities. The Plastics World Index for plastics resin production stands at 100 for both January and February—meaning that production for these months was a standoff with the same months in 1970. The Plastics World Sales Indexes for the same months were 96 and 100, respectively.

The activity in the major processing areas was likewise sluggish for the first 2 months of 1971. From an average Consumption Index of 119 for all of 1970, extrusion consumption dropped to 104 and 105. For the same period the Consumption Index for injection molding was 96 and 100. Reinforced plastics showed the greatest drop with January and February Consumption Indexes of 81 and 82.

The Tariff Commission reports for January and February plastics production and sales do not give values for alkyds, cellulose and certain other categories that had previously been reported. This is the first specific indication of their move to phase out these reports. SPI's Committee on Statistics now is issuing its monthly report.



Custom molders' shipments show continued rise

The 1969 shipments of plastics products by establishments in the SIC category 3079 (miscellaneous plastics products), often called "custom molders", showed an increase over 1968 of approximately 9 percent in both dollar and pound volume. This compares with an increase of approximately 17 percent that was shown for 1968 shipments over 1967.

These data are reported in the U.S. Department of Commerce Report Series: MA-30D (69)-1 published in May of this year. This is a continuing series of reports that started in 1960 to determine the types of products being produced by this largest single group of plastics processors.

This publication also provides a record of the shipment in dollars and pounds of more than 100 products in SIC 3079.

Shipments of Selected Plastics Products

Product category	1967		1968		1969	
	Millions of lb	Millions of dollars	Millions of lb	Millions of dollars	Millions of lb	Millions of dollars
Unsupported plastics film, sheets, rods, tubes and stock shapes	1892	1030	2144	1177	2371	1273
Foamed plastics products	512	429	622	546	651	568
Laminated sheets, rods and tubes	176	330	212	377	227	416
Plastics packaging and shipping containers	902	784	1060	916	1153	1026
Industrial plastics products	836	1289	945	1428	996	1526
Construction plastics products	474	391	578	519	684	607
Plastics dinnerware, tableware and kitchenware	189	181	197	188	206	209
Consumer and commercial plastics products not elsewhere classified	485	550	602	660	646	705
Plastics products not specified by kind	26	210	24	243	27	265
Total	5492	5194	6384	6054	6961	6595

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Eastman brings you some old plastics with some young ideas.

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For information just write or call Eastman Chemical Products, Inc., Plastics Division, Kingsport, Tennessee 37662.

You may be surprised how much life is left in the over-thirty generation.

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Kodak



Yo Yo's have to be tough, but they also have to be colorful. That's why the Flambeau Plastics Corporation of Baraboo, Wisconsin molds the genuine Duncan® Imperial® Yo Yo from strong, durable TENITE acetate. With a broad range of colors, transparent, translucent or opaque.

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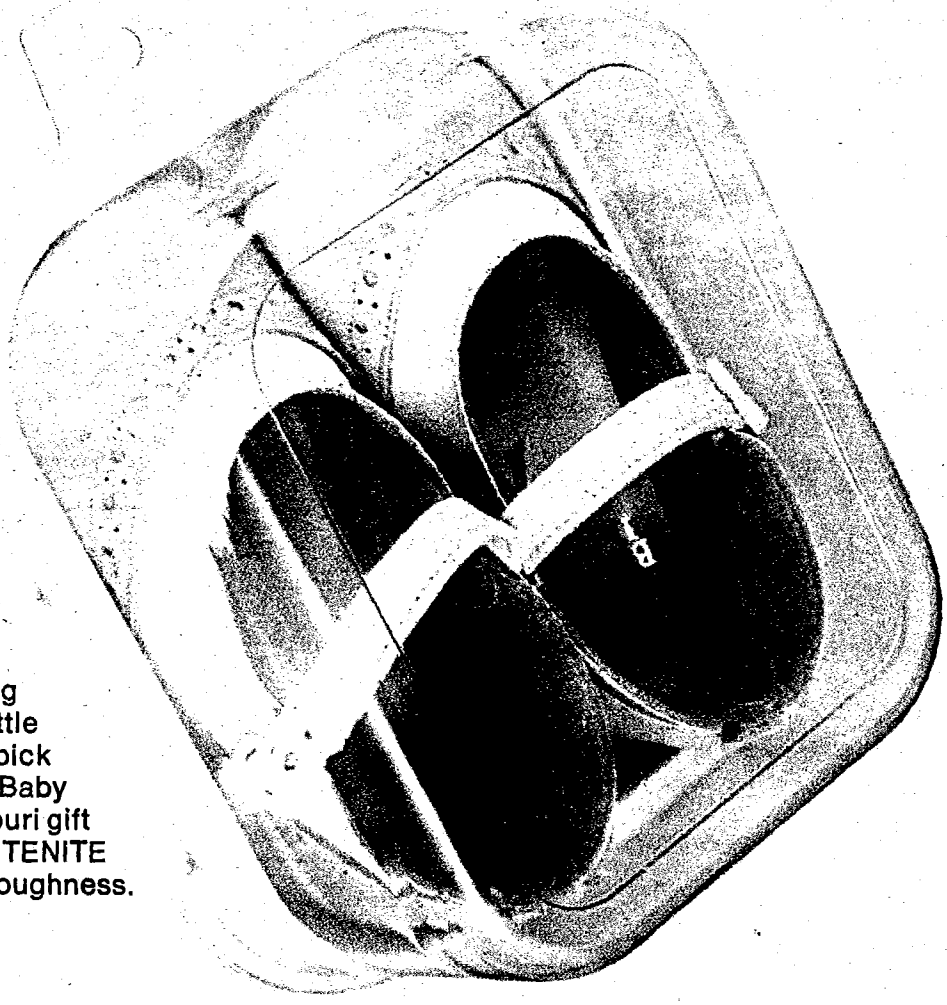
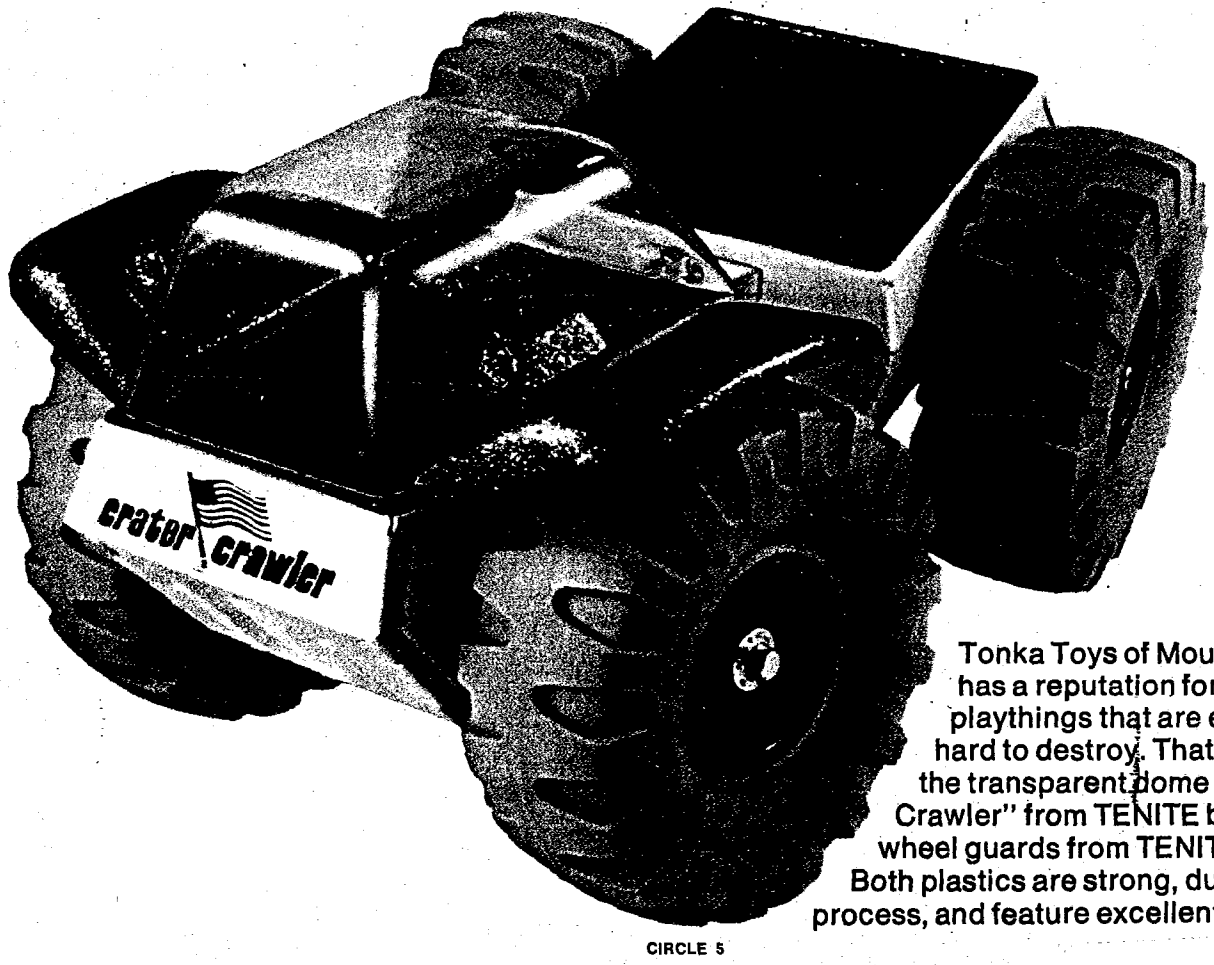


Baby shoes shouldn't start getting scuffed until they're on the little scuffer. But mothers like to pick them out by looks. So Darling Baby Shoe Co., of St.Louis, Missouri gift packs their shoes with TENITE propionate. For clarity. For toughness.



Tonka Toys of Mound, Minnesota has a reputation for building playthings that are easy to enjoy but hard to destroy. That's why they mold the transparent dome of the "Crater Crawler" from TENITE butyrate, and the wheel guards from TENITE propionate. Both plastics are strong, durable, easy to process, and feature excellent color retention.

CIRCLE 5

DSW 588009

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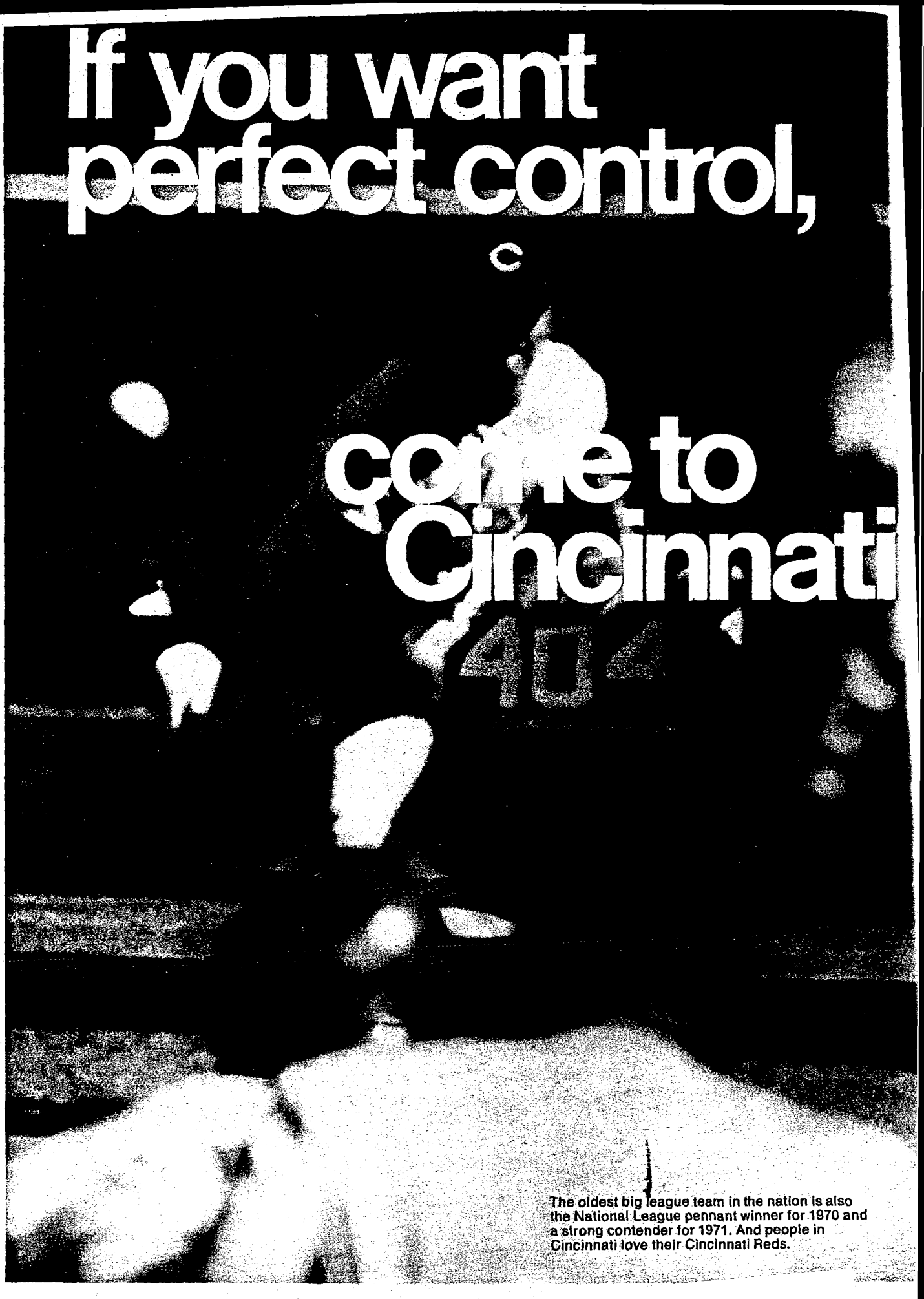
If you want perfect control,



come to Cincinnati

The oldest big league team in the nation is also the National League pennant winner for 1970 and a strong contender for 1971. And people in Cincinnati love their Cincinnati Reds.

DSW 588010

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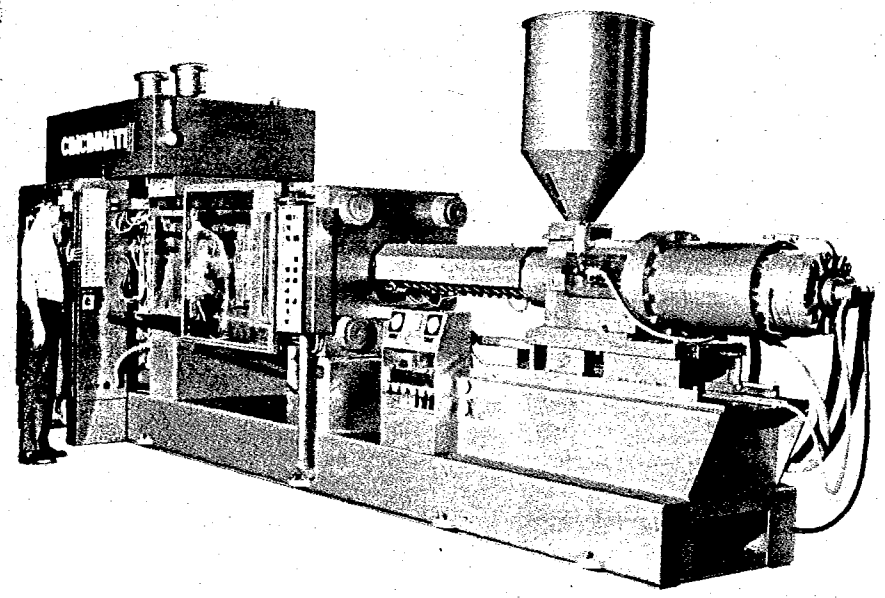
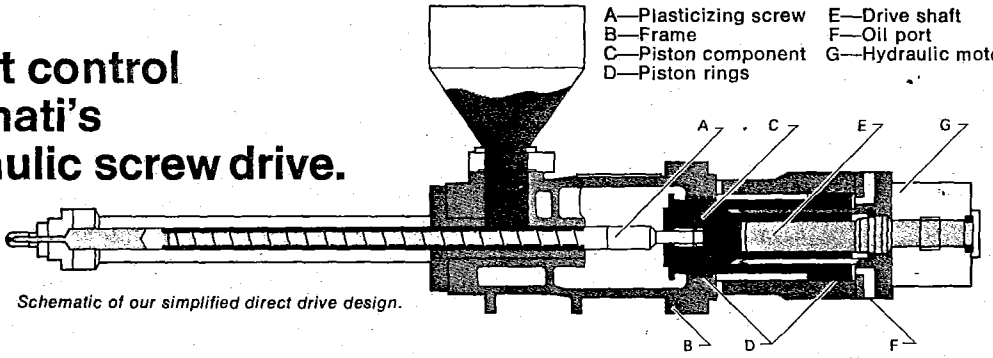


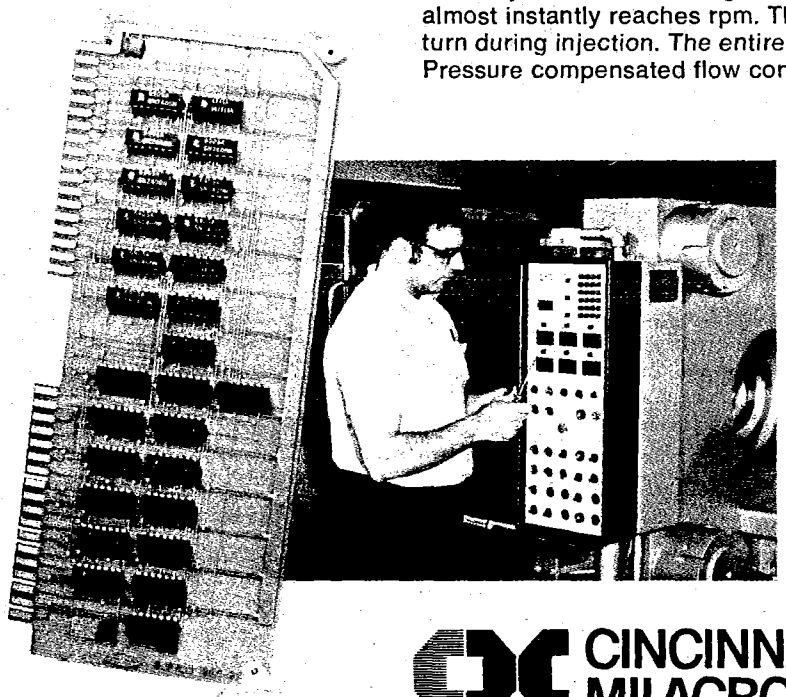
Of course you can get perfect control on any Cincinnati Milacron injection molding machine from 150 tons to 3000 tons. With direct hydraulic screw drive and integrated solid state controls and plug-in circuit logic cards. You also get some other advantages—maintenance-free performance, quiet operation, more than adequate clamp stroke, good tie-rod spacing, hydraulic knock-out with unusual knock-out options, and versatile platen arrangement.

Precise shot control with Cincinnati's direct hydraulic screw drive.



Schematic of our simplified direct drive design.

Cincinnati Milacron's injection molding machine has a greatly simplified direct hydraulic drive that gives you perfect shot control. On start, the screw almost instantly reaches rpm. The screw stops instantly and cannot turn during injection. The entire drive operates in a bath of oil for low wear. Pressure compensated flow control valves control injection speed.



The Cincinnati Acramatic integrated circuit control gives you perfect control of every function. Digital timers, settable from 0.1 second to 99.9 seconds, are as accurate as your 60 cycle current. The "cooling" timer is also equipped with a range switch from 1 to 999 seconds for long cures. The solid state control directly drives the D. C. solenoids for maximum dependability. If you can't come to Cincinnati to see our machine (and the Big Red Machine), call or write. Cincinnati Milacron, Plastics Machinery Division, 4165 Halfacre Road, Batavia, Ohio 45103. Phone 513/724-7001. Formerly the Cincinnati Milling Machine Co.

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CIRCLE 6

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Plastics may solve radioactive waste-pollution problem

Many environmentalists label plastics as pollutants (see special report on "Plastics & Ecology", pp. 41-82) and overlook the solutions plastics contribute to ecology.

One of the most dramatic examples of plastics' potential as an environmental benefactor is the system utilizing polyethylene for radioactive waste disposal. This system was discussed by Dr. Wolfgang Mack, president, Werner & Pfleiderer Corp., Waldwick, N. J., at the recent Composting-Waste Recycling Conference in Denver.

During this discussion Mack reported that plastics materials used as matrices may be most instrumental in the safe disposal of radioactive waste products. Matrices presently used, such as concrete, asphalt and glass, do not offer adequate protection against leaching, a potential source of massive radiation contamination of ground water.

Also none of these materials completely fulfills the other three prerequisites for a good binder. These are relatively low specific gravity to keep the transportation problem within reason, ease of incorporating the radwastes themselves and low cost.



Dr. Wolfgang Mack, Werner & Pfleiderer, feels that plastics materials and processing equipment will help us to preserve our environment, especially in the area of radioactive waste disposal.

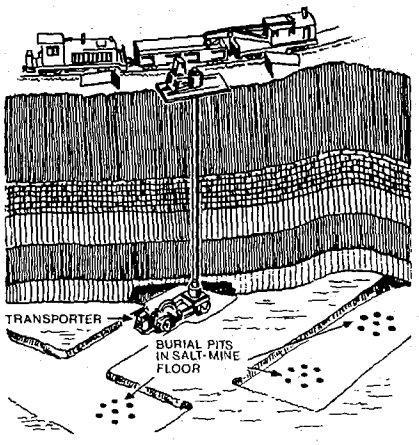

Diagram shows radioactive waste-disposal method that involves transporting wastes in some suitable binder, such as polyethylene, to abandoned salt mines for storage.

Although polyethylene is more expensive than other binding materials, it appears to more than meet the other requirements. Mack reports that PE has been used successfuly as a binder at the Nuclear Research Center at Karlsruhe, West Germany. And it was found that PE offers definite advantages over asphalt. PE is stronger, 40 percent lighter and considerably more leach-resistant. In addition, it can be loaded with more solids and provides a better nuclear shield.

Mack concludes, therefore, that it seems there are many properties of plastics materials that favor their use as a matrix for the storage of radwastes.

In the meantime, plastics processing equipment, such as twin-screw extruders, already is being used for radwaste binding purposes. Mack reports that much of the radwaste removal work performed in Europe has involved such equipment. The reason for the effectiveness of twin-screw compounders for this process is the self-cleaning aspect of these machines.

Moreover, the entire operation is controlled remotely and can run without interruption for many months. Therefore, Mack feels that Werner & Pfleiderer's extruder evaporator, ZKSK-120, may be an important key in handling radioactive wastes.

At the conference Mack also discussed the recycling of plastics wastes made possible by such equipment as Werner & Pfleiderer's "Remaker" injection-molding machine, which reportedly can process 100-percent scrap.

Plastic 'bags' babies



For years plastics have been used to package fragile things and now they are being used to protect the most valuable and most delicate of items —newborn babies.

A team of pediatricians and an electrical engineer at the University of Cincinnati Medical Center hospital has developed a plastic baby bag with a head shield that they consider a superior way to keep a newborn warm. Because conservation of heat during a baby's first hours is so important, the plastic swaddler has been nicknamed "The Lifesaver".

The bag material, used primarily as cushioning in commercial packaging, has air pockets shaped like truncated hemispheres sealed between two layers of polyvinylidene-coated polyethylene. The bags were made especially for the Cincinnati study by the Sealed Air Corp., Fair Lawn, N. J.

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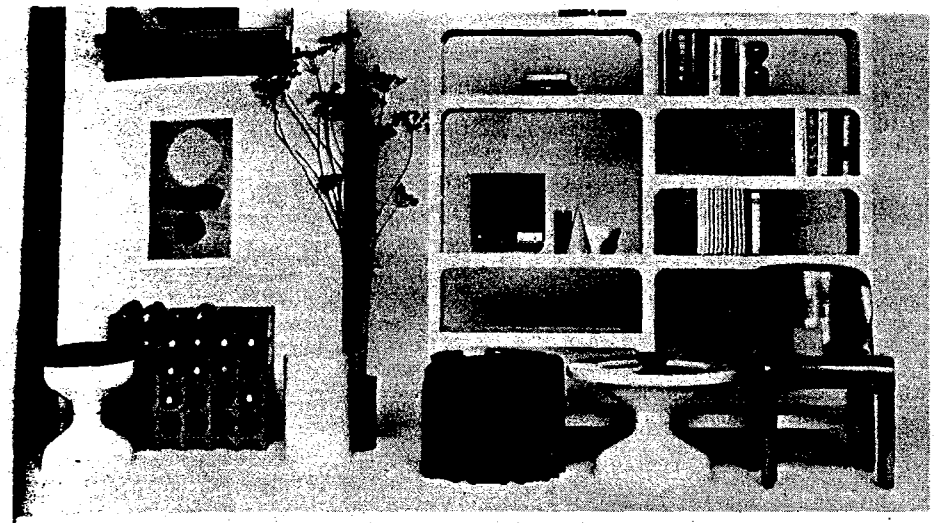
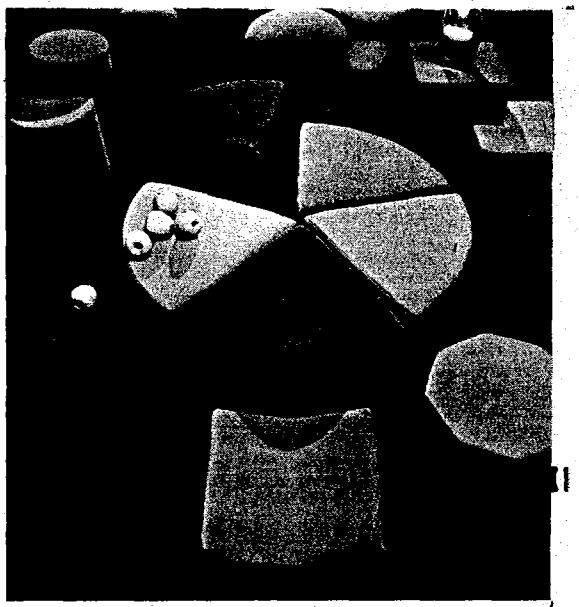


All-ABS furniture, produced in U.S. by Beylerian, Ltd., is based on designs that originated with Kartell of Italy.



Sculptured urethane-foam seats and serving accessories are made in whimsical shapes by Flomar Industries.

Smiles light up one industry show . . .

Almost everyone was optimistic at the Spring Furniture Market in High Point, N.C., in April. Furniture manufacturers wrote more business than was expected, as retailers acted on their belief that consumer spending will increase significantly by early Fall.

This optimism is particularly encouraging to the plastics industry. Furniture continues to be the industry's hottest market. Material consumption, currently estimated at 3/4 billion lb, including cushioning and upholstery, is expected to climb to 1.25-1.35 billion lb/year by 1980.

To a plastics industry observer at the show, however, several points were of special significance:

The long-awaited "explosion" of plastics-as-plastics furniture did not materialize. "The market simply isn't ready for it," one furniture maker declared. "'Plastic modern' may become the most popular style, but it probably won't be for at least 5 more years." The consensus among furniture manufacturers is that no one style will dominate for the next few years. Many styles and designs will allow consumers to satisfy their eclectic tastes.

Tremendous amounts of plastics-as-wood were seen at the show. Decorative, functional and structural plastics parts were everywhere—from headboards to table legs, from chair and mirror frames to wall shelves. But this time, no one apologized. Plastics applications were discussed openly, and manufacturers and retailers agreed on plastics' special benefits and advantages.

Sophisticated finishing procedures were much in evidence. The finish of wood-plastic combinations made the two blend together as if the entire unit had been made of one material.

And, finally, furniture designers have begun to take advantage of plastics' ability to meet two special needs of today's apartment dwellers: compactness and versatility.

. . . while frowns pervade another

There were few smiles at the mid-April Design Engineering Show in New York. Both attendance and number of exhibits were down, and business activity might best be described as listless. However, several displays were of unusual interest to the plastics industry.

Among the relatively few show-stoppers was a 14-ft-dia nylon gear shown by Polyplenco, Ltd., the British subsidiary of Polymer Corp. Believed to be the world's largest operational plastics gear, it was cast in 28 segments and is used in a British electricity generating station.

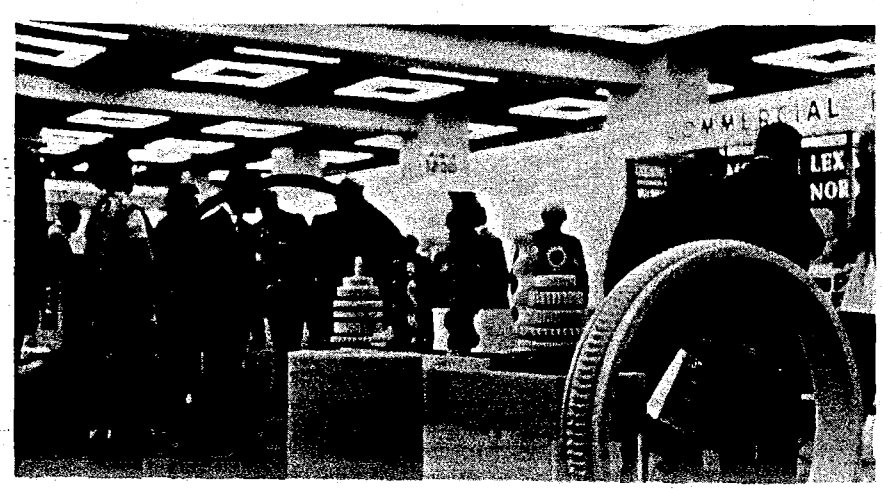
Hercules exhibited UHMW HDPE in gears, pipe fittings and couplings. Also shown was a hydroxypropyl cellulose that is edible, water-soluble, acts as a binder, and can be molded, formed or extruded.

Fiberfil Div., Dart Industries, Inc., launched a family of four fiber-glass-reinforced, foamed engineering thermoplastics—nylon, styrene, polypropylene and vinyl aromatic polymer—which can be molded on conventional screw-injection machines. Fiberfil also showed flame-retardant glass-reinforced materials and introduced a line of reinforced polyethylene terephthalates, which are expected to compete with nylon in electrical applications.

Chevrolet's flexible engine-cooling fan, the first offered as original equipment on an American auto, was exhibited. Injection-molded of Du Pont's glass-reinforced "Zytel" nylon, the one-piece fan has irregular blade placement around the hub to reduce noise and currently is offered on the air-conditioned Vega.

Du Pont demonstrated modern assembly techniques, including spin welding, snap fitting and the shear joint, an improved method of ultrasonic welding developed in Europe. Branson Sonic Power displayed a compact ultrasonic welder that integrates power supply and stand in one unit.

Commercial Plastics & Supply Corp., the only distributor at the show, displayed giant slipper blocks and nylon rollers, heavy nylon castings and bushings, and an 800-lb "Teflon" billet.



Large, one-piece cast-nylon gears drew attention to the Commercial Plastics & Supply Corp.'s exhibit at the Design Engineering Show.

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Finest Quality
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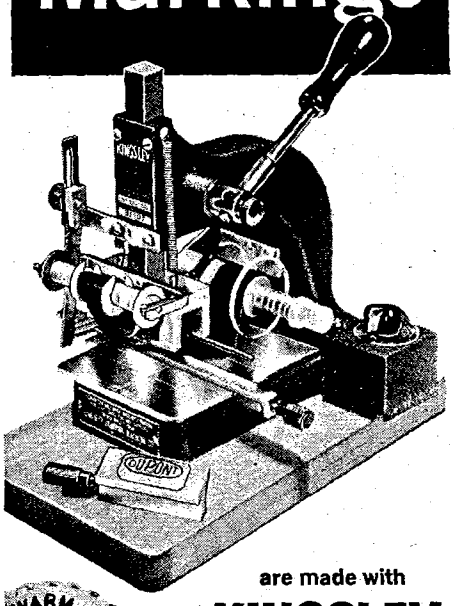

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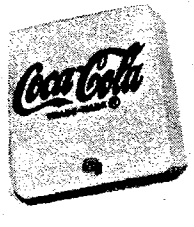

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CIRCLE 7

Ecology, machinery dominate 40th Annual Packaging Exposition

It's almost a foregone conclusion these days that wherever there are plastics or packages on exhibit, a major point of conversation will be the environment. And this year's 40th Annual American Management Assn. Packaging Exposition and Conference in Chicago was no exception.

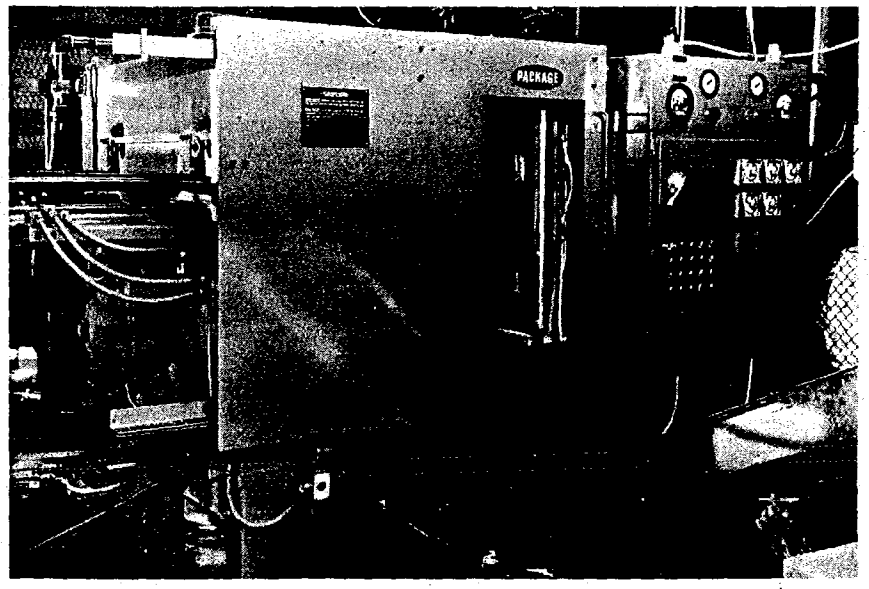
From the keynote speech by Jack Yogman, executive vice president of Joseph E. Seagram & Sons, to a five-paper symposium on "Packaging, Ecology and Recycling" and to the exhibits themselves, one had a difficult time eluding the specter of pollution. Even the federal government's Environmental Protection Agency had a booth and provided one of the symposium speakers.

Although awareness of environment dominated the conference, the major exhibit interest from a plastics standpoint centered around processing equipment. Package Machinery Co., East Longmeadow, Mass., displayed its "Softpak" foam-molding machine that it said to require only 1/3 the conventional time to produce dry, ready-to-use parts.

Egan Machinery Co., Somerville, N. J., introduced a computer-controlled blown-film coextrusion line that includes a sealer/serrator and automatic winder for bag production. (See this issue, p. 84.)

Most popular blow-molding exhibits belonged to Hayssen Mfg. Co., Sheboygan, Wis., and Automatic Liquid Packaging, Inc., Elk Grove Village, Ill. The Hayssen "Monablow" single-station unit can blow up to 600 quart bottles/hour. ALP was showing its "Bottle Pack 302" machine that blow-molds, fills and seals in one operation. It can produce up to 1000 containers/hour, all completely sterile.

Other items of interest included a new low-cost solid-state temperature controller from West Instruments, Schiller Park, Ill., and ultrathin HDPE film ("Tissuthene") from M.G.S. (Plastics), Ltd., Buckinghamshire, England.



"Softpak" automatic foam-molding machine was a hit at the recent Packaging Show. Fast molding cycles produce 1- or 1/2-inch-thick foam parts that can be designed with integral hinges, formed cavities and variable internal densities.

Foam cups give plants good start

PS-foam cups, used by the billions for hot and cold beverages, now are being employed as plant starters.

Nurseryman F. D. Hall, Butler, Pa., who has used 50,000 to 75,000 6-oz foam cups/year for the past 7 years, recommends them as the ideal plant starter for the home gardener.

Hall says that the low-cost, reusable cups provide distinct advantages over peat pots and other containers. Their insulating properties preserve moisture even in hot, dry weather, and they prevent potentially damaging tangling of roots with neighboring plants.

DSW 588014

STLCOPCB4093350

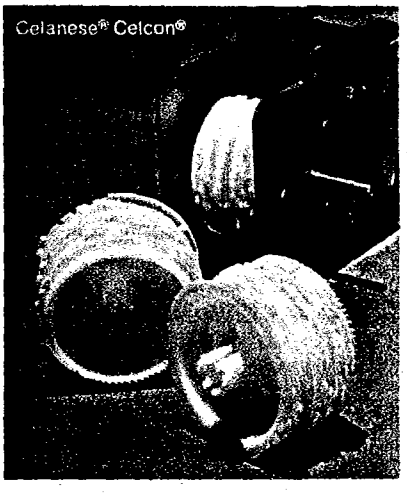
How a little Celcon keeps the wash on time.

When the timing mechanism in a dishwasher or washing machine goes out of whack there's the devil to pay. So appliance manufacturers sat up and took notice when Controls Co. of America, a division of The Singer Co., came up with a new timer that's far more reliable, smaller and thinner than others on the market.

The new timer design features a one-piece multi-surface cam block molded of Celanese Celcon resin. It replaces a complex assembly of 16 components. The single Celcon part performs the functions formerly required of 14 cams, one bearing and a gear. And not only does the molded Celcon multi-cam perform more functions in less space, it can't become misaligned because there's nothing in the one-piece unit to misalign.

Only an acetal plastic like Celcon could make this unit possible. Because only a plastic like Celcon has the combination of toughness, wear resistance and strength required. Plus the dimensional stability to permit tolerances of ±.005" on a 2.50" radius and ±.002" on a .45" dimension.

Get all the facts about Celcon. Like its bearing qualities, low coefficient of friction, self-lubricity. And its 105°C UL electrical rating is higher by far than other acetal resins.



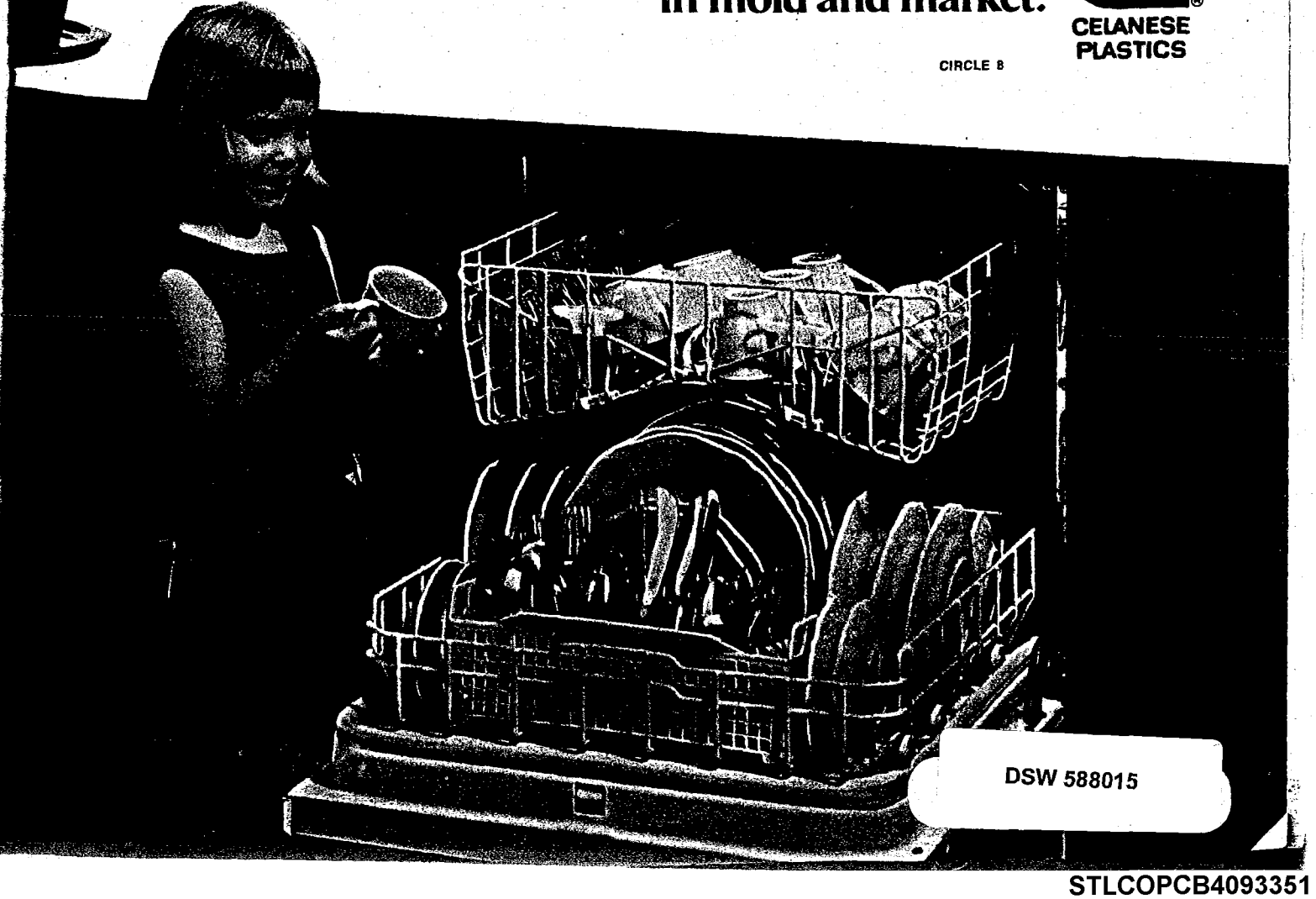
Write: Celanese Plastics Company, Dept. C-209, 550 Broad Street, Newark, N.J. 07102.

Celanese Plastics Company is a division of Celanese Corporation. Canadian Affiliate: Chemcell Resources, Ltd. Export: Amcel Co., Inc., and Pan Amcel Co., Inc., 522 Fifth Ave., New York 10036.

Celcon: performance proved in mold and market.

CELANESE PLASTICS

CIRCLE 8



DSW 588015

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RP/C Division changes name to RP/C Institute

To express more exactly the scope of its activities, The Society of the Plastics Industry's Reinforced Plastics/Composites Div. unanimously voted to become the Reinforced Plastics/Composites Institute.

During its existence—more than 25 years—this group has been the spokesman for this industry, not only in the U.S., but also in Canada and abroad. It also has become a focal point in the technical and market development of this major segment of the plastics industry and serves as an information center.

This group also created and continues to develop the RP/C Technical and Management Conference. This is the largest annual conference in the world centered on a single family of materials.

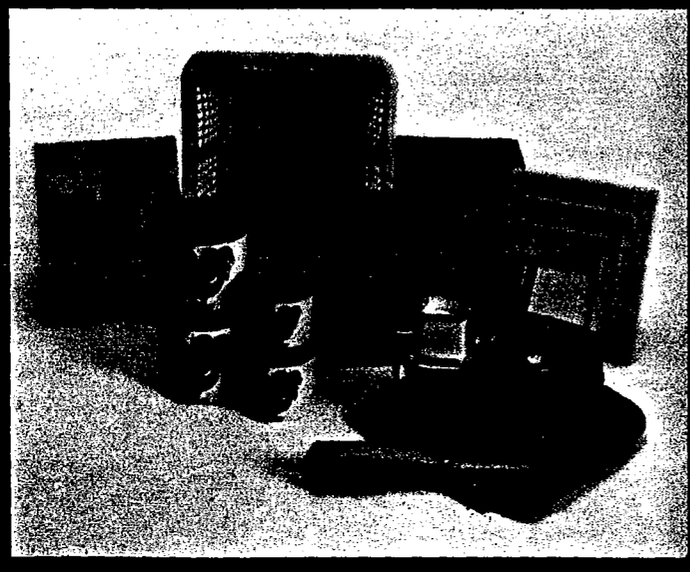
Committees functioning under the RP/C Institute include Fiber Glass Reinforced Panel Council, Reinforced Thermoset Molding and Machine-Made Pipe and Fittings.

On the materials front, some prices go up . . .

Material	Company	Increase	New Price	Type or Grade
ABS	Marbon Div., Borg-Warner Corp.	$0.02/lb	—	Colored resins (not black or gray)
	Uniroyal Chemical, Div. of Uniroyal, Inc.	$0.01/lb	—	"Kralastic" utility black and gray compounds
		$0.02/lb		"Kralastic" color compounds
High-density polyethylene	Union Carbide Corp.	$0.01/lb (withdrawal of temporary allowance)	$0.135/lb (hopper-car lots)	Injection-molding grades
Low-density polyethylene	Enjay Chemical Co.	—	$0.115/lb (hopper-car lots)	General-purpose housewares molding grades
		—	$0.12-0.135/lb	Low-melt-index specialty grades
		—	$0.135/lb	Container-lid grade
Polyester	American Cyanamid Co.	$0.005-0.020 /lb	(less than truckload lots)	"Laminac"

Men who make quality products.

plastic colors



Choose your color, name your coloring system, and we'll give you colorants to crow about. Paste, concentrates, dry colors and gel coats — Ferro is the only one in the industry that makes all coloring systems. Call Ferro for objective answers, based on objective ideas.

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. . . but more go down

Material	Company	Decrease	New Price	Type or Grade
ABS/polycarbonate alloy	Marbon Div., Borg-Warner Corp.	$0.15/lb	$0.60/lb	"Cycoloy" 800 (custom colors)
Polyester	Celanese Plastics Co.	$0.20/lb	$1.20/lb (truckload lots)	"Celanex" 917 injection-molding grade)
Polyethylene compounds, glass-reinforced	LNP Corp.	$0.07/lb $0.06/lb	(truckload lots) (truckload lots)	"Thermocomp" FF-1004 and 1006 "Thermocomp" FF-1002
Polypropylene compounds, glass-reinforced	LNP Corp.	$0.10/lb Up to $0.14/lb	(truckload lots) (truckload lots)	"Thermocomp" MF natural and black "Thermocomp" MF colored
Nylon	Du Pont Co.	10 percent (approximately)	$1.10/lb (truckload bag lots) $0.90/lb (truckload bag lots)	Flame-retardant grades: "Zytel" 51 SE-1 BK-40 "Zytel" FE-2862 NC-10

SPI appoints G. R. Munger general manager

Ralph L. Harding, Jr., executive vice president of The Society of the Plastics Industry, recently announced that G. R. Munger has been appointed to the newly created position of SPI general manager.

Harding said that "creation of this type of two-man management has been made necessary because of the rapidly expanding workload for the SPI staff." In his new position Munger will concentrate on staff supervision, while Harding will represent the Society and its members to their customers, government agencies and the general public, especially on environmental matters. Both men will provide liaison with the 1500 member companies and 58 operating units.

Munger, who joined the SPI staff in 1967, formerly served as executive director of the Plastics Pipe Institute, a division of the Society. Previously he spent many years in industry, including several with Owens-Corning Fiberglas Corp.

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Rain fallin' or sun shinin'... Ferro heat and light stabilizers help keep PVC products looking better, longer. Other additives include: UV absorbers, anti-oxidants and curing agents for PVC's, polyolefins, polyesters and polyurethanes.

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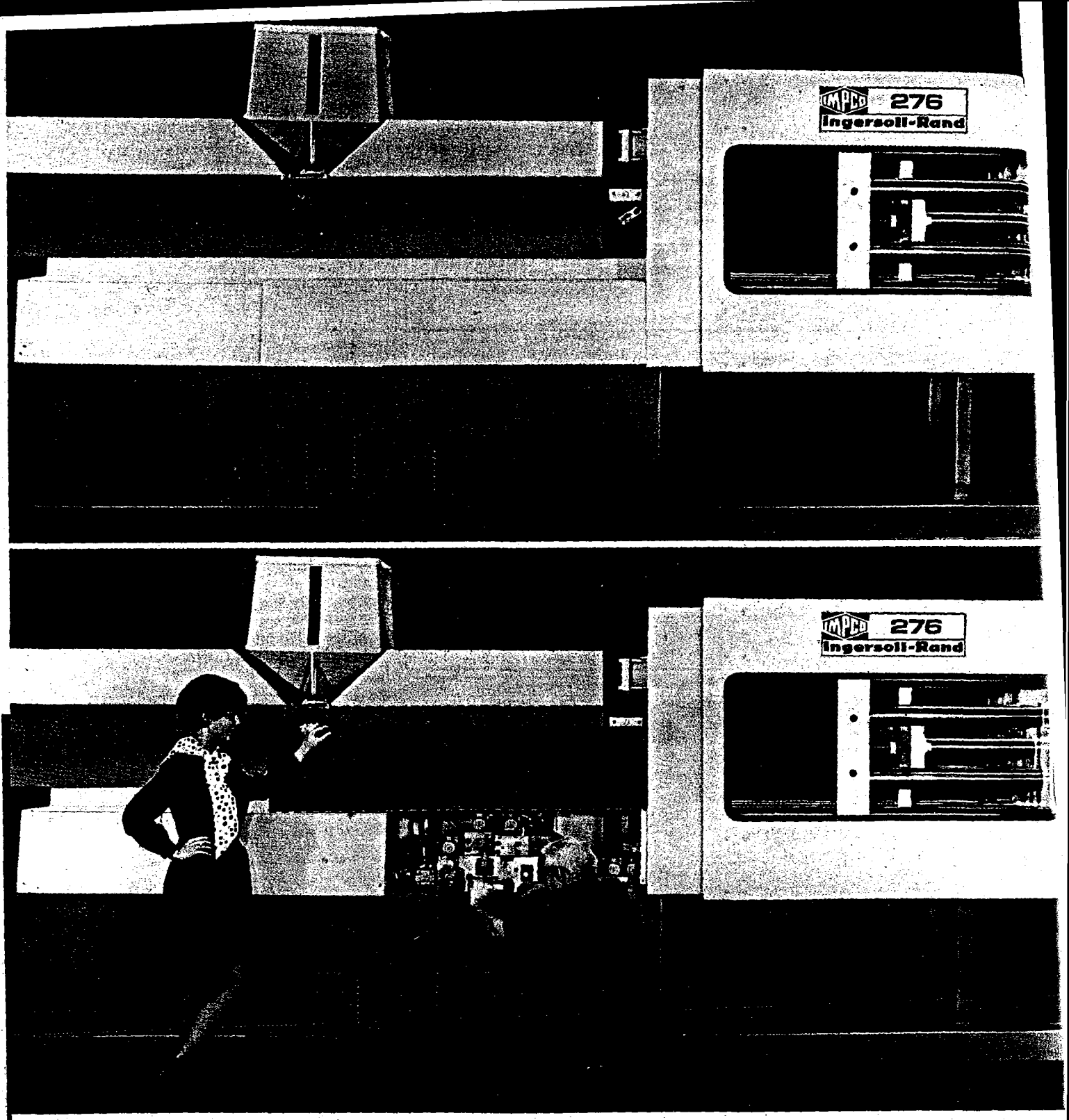

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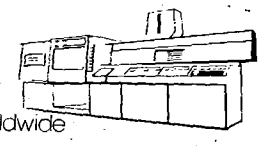

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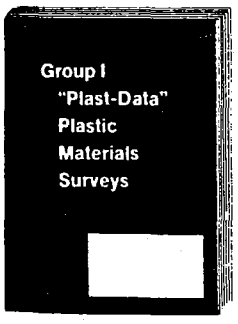

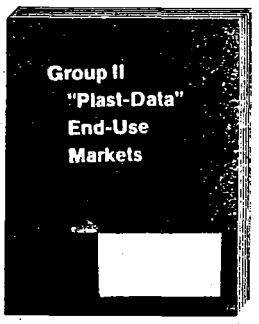

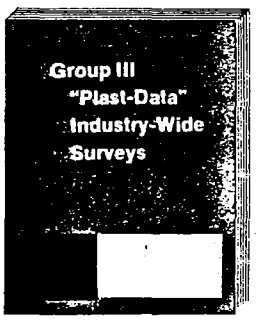

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57 Plastics Industry Trends	58
59 Pollution Control	60

Reports and Profiles listed below provide valuable World-Wide data on capacities, consumption-production trends, imports-exports, legislation, new products and applications, raw materials, pollution control, prices, costs, marketing and technology for each material listed—fully organized and cross-referenced for easy use.

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15 PLASTICIZERS	16
17 POLYETHYLENE (H-D)	18
19 POLYETHYLENE (L-D)	20
21 POLYPROPYLENE	22
23 POLYSTYRENE	24
25 POLYURETHANE	26
27 PVC (U.S.)	28
29 PVC (World-non U.S.)	30
31 REINFORCED PLASTICS	32

Consumption patterns, new products and new applications are highlighted in these Reports and Profiles on major end-use markets for plastics materials. Coverage includes supply-demand trends and forecasts; revealing insights on producers and consumers; legislation and technology affecting plastics markets, U.S. and World-Wide.

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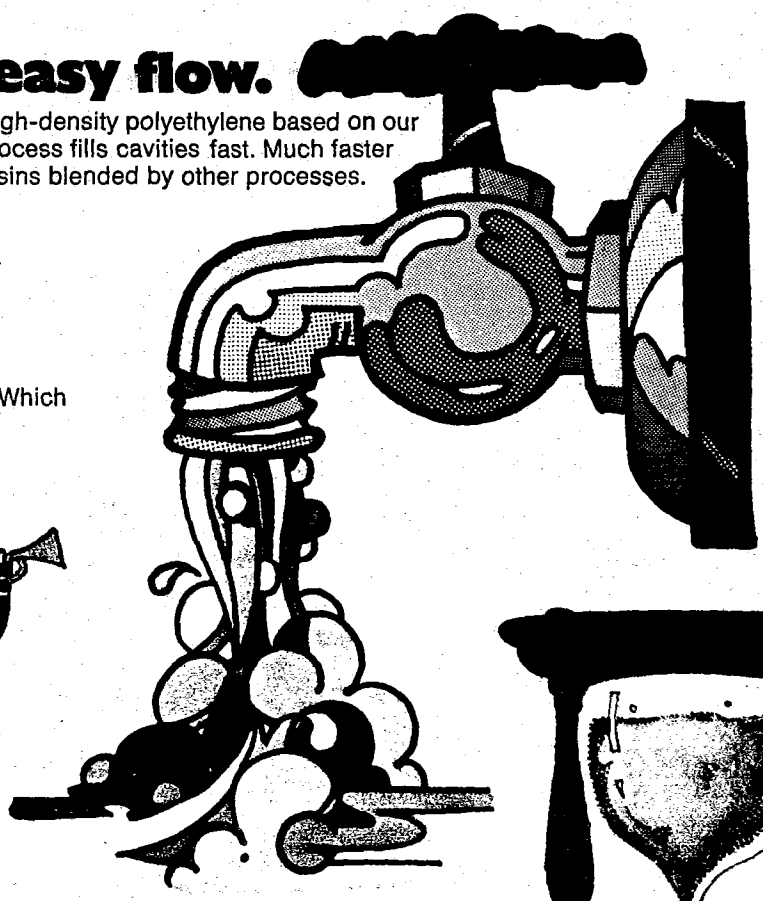

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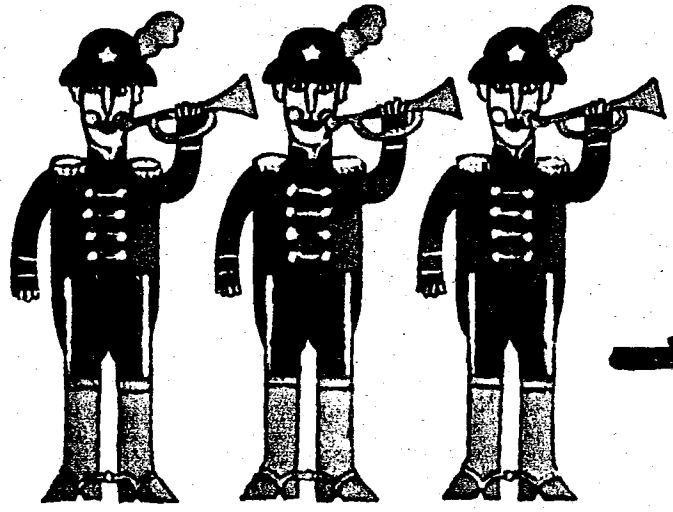
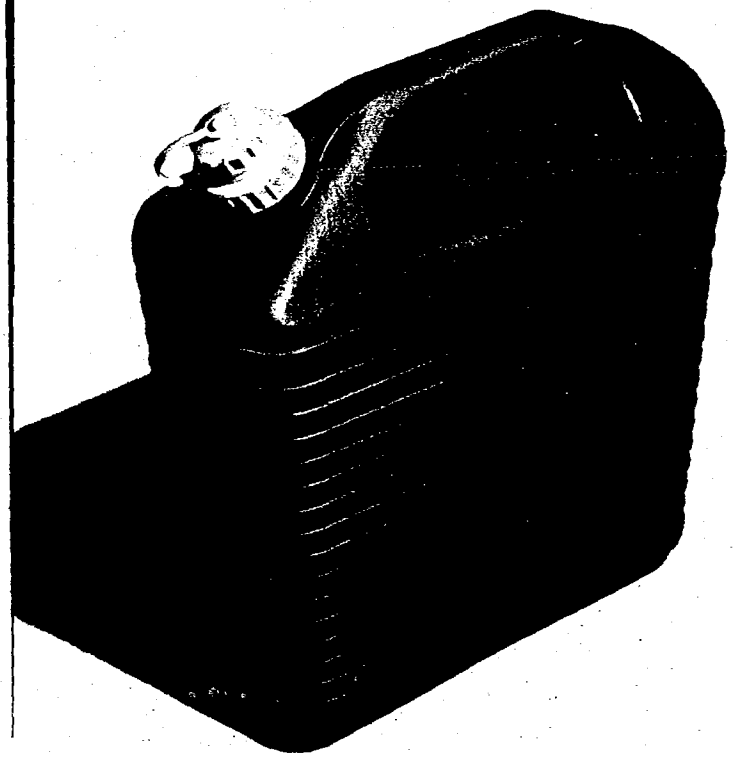
Our new HDPE process assures material with little variation in properties from lot to lot. Which can greatly reduce downtime and reject parts.





decreased cycle time.

Our HDPE can help decrease your cycle time and increase productivity. For more parts per hour.



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CIRCLE 11

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In the plastics field, as in others, Fenwal temperature controllers are solving just about every problem in the book. Dual and single channel, thermocouple sensing models with integrated circuit design, and in temperature ranges from −200 to 2500°F.

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Series 525, left, incorporates many of the 524 features in a minimum panel space, DIN standard design. Unique up front heat sink keeps components cool.

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CIRCLE 12

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Polyurethane foam. The potatoes' homeowner's policy.

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Simply put, it was using Reichhold polyurethane foam resin systems to spray up the interior of potato storage buildings with foam.

The result? Potato storage so efficient and effective (spoilage dropped drastically) that RCI polyurethane foam is actually a key factor in stabilizing potato prices.

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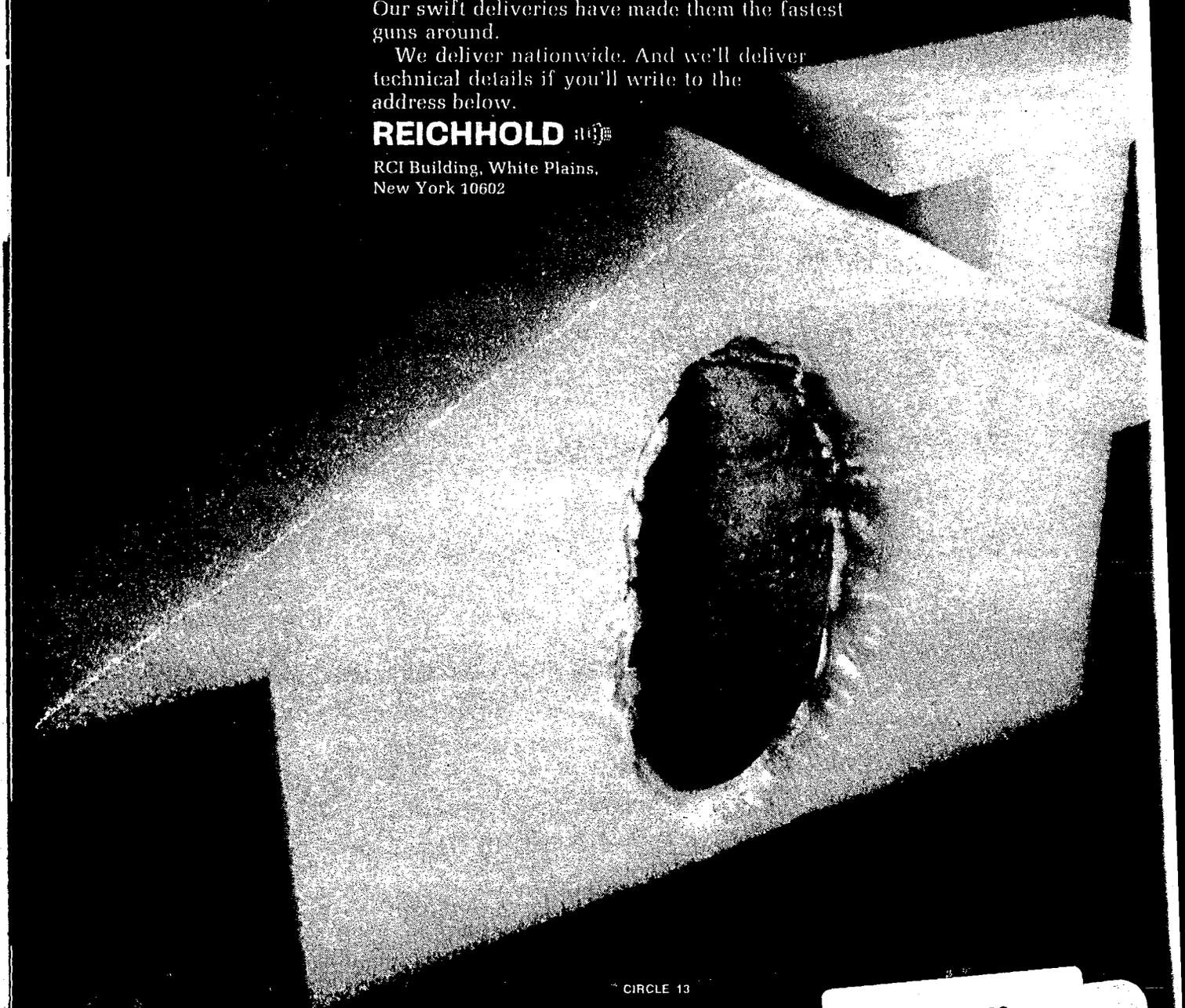

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SYNTHETIC FIBERS IN PAPERMAKING, edited by O.A. Battista, FMC Corp. Contains chapters by experts on such subjects as Acrylics, Polyamides, Polyester fibers and others. Appendix. Glossary of papermaking and related terms. Index. 340 pp. $14.95

REINFORCEMENT OF ELASTOMERS, edited by Gerard Kraus, Phillips Petroleum Company. Chapters by leading scientists in rubber chemistry, physics and technology cover all important aspects of theory and practice of reinforcement of rubber by particulate colloidal fillers. 612 pp. $24.50

FILAMENT WINDING: ITS DEVELOPMENT, MANUFACTURE, APPLICATIONS AND DESIGN by D. V. Rosato and C. S. Grove, Syracuse University. Answers virtually every question that might be raised about filament winding by research and development groups, designers, manufacturing and marketing personnel. Discusses windings for aerospace, hydrospace and commercial industries. 360 pp. $17.50

PRINCIPLES OF COLOR TECHNOLOGY by Fred W. Billmeyer, Jr., Rensselaer Polytechnic Institute and Max Saltzman, Allied Chemical Corporation. An introduction to color and its use in industry for people working with color in the production of colorants or the coloring material. 181 pp. $11.95

MAN-MADE FIBERS: SCIENCE AND TECHNOLOGY edited by H. Mark, Polytechnic Institute of Brooklyn, Sheldon M. Atlas, Bronx Community College and Enrico Cernia, A.B.D.C., Rome, Italy. Monographs by international authorities reflecting the important trends in production and development of industrial fibers. Volume III, Acrylics, Vinyls, Elastomerics (Spandex), Metal Fibers, Finishing, Dyeing and Testing of Fibers. 706 pp. $29.95

PLASTIC FOAMS Volume 1: Chemistry and Physics of Foam Formation. Volume 2: Structure, Properties and Application by Calvin James Benning, International Paper Company. A comprehensive treatise on all types of plastic foams. Discusses every conceivable type of plastic from urethane and styrene to polysulphone. "It's completeness and thoroughness are commendable." — SPE Journal. 1028 pp. Two-volume set. $75.00

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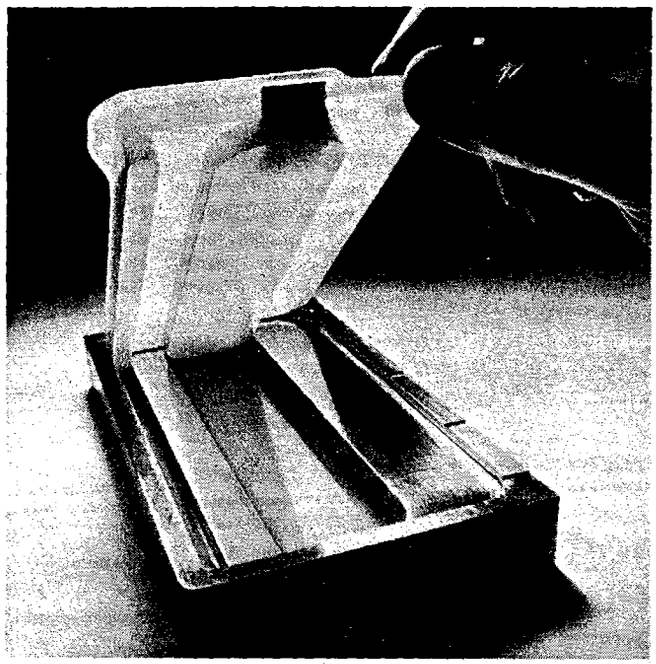

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Roll mounted and cutter set up in less than 5 minutes
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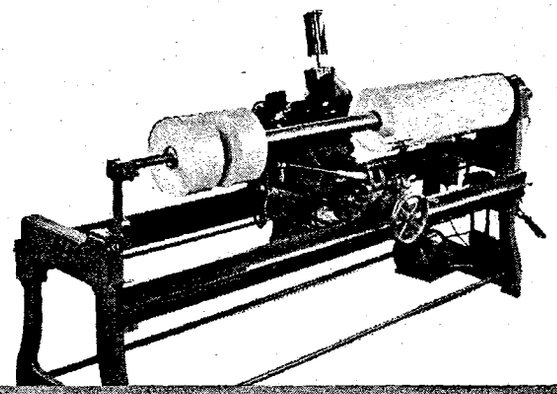
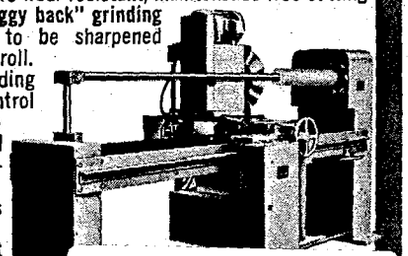


315—Automatic Straight Line Cutters—Completely Automatic. For narrow width continuous cutting and rolls larger than 18" diameter. Straight line lathe cut stroke eliminates vibration and offers wear resistant, maintenance free cutting assembly. Patented "piggy back" grinding system, allows knife to be sharpened while cutting through roll. The first positive grinding system. Electronic control system allows knife to "feel" firmness of roll and adjust forward cutting motion accordingly. Available in all widths to 180" material.
6 Judcut 315 straight cutters available for rolls 12" diameter to 36" diameter.



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CIRCLE 44

STLCOPCB4093360

plastics management

ideas for decision-makers

Six-step approach to formulating company strategy

Corporate strategy is the dominant concern of most top executives. In recent years, managers in some of the larger companies have adapted highly sophisticated—and expensive—planning techniques, including mathematical models, systems analysis, computerized programs and even full-time planning departments. For the smaller and medium-sized companies, however, the conference table remains the place where strategy is formulated. And judgment, experience, intuition and well-guided discussions continue to be the keys to success.

Writing in Harvard Business Review, Cornell University Prof. Frank Gilmore suggests that the top managers of small and medium-sized companies follow this step-by-step outline for guiding a strategy discussion:

1. Record current strategy—including such items as desired return on investment, growth rate and share of market.
2. Identify problems with the current strategy. Are you having difficulty implementing the strategy? Can you see any significant weaknesses or unutilized strengths in the company? Will environmental trends present threats and/or missed opportunities if changes aren't made?
3. Discover the core of the strategy problem. Does the plan require greater competence or resources than the company possesses? Does it fail to fully exploit the company's distinctive competence? Does it lack sufficient competitive advantage?
4. Formulate alternative new strategies, keeping in mind the company's competence and resources and management's preferences and sense of social responsibility.
5. Evaluate alternative new strategies. Which offers the greatest competitive advantage? Which minimizes the creation of new problems?
6. Choose a new strategy.

Custom molders: do you know who—or where—your customers are?

One of the toughest decisions a custom molder must make is how to go after new business. Among those who lacked a definite program in this regard was G-W Plastic, Bethel, Vt. Until a year ago, that is.

That was when G-W decided to invest a modest sum of money in a direct-mail campaign. Matching the products made by its existing customers with the government's SIC lists, G-W came up with a dozen key SIC numbers. "We decided that we'd also like to be doing business with eight other growth industries within the next 10 years, and so ended up with 20 SIC categories," sales manager Richard Heater declares.

Then, the company purchased a mailing list of about 1000 companies, each of which had more than 500 employees. With the mailing piece to be sent to general managers, purchasing directors and chief engineers, the total came to 3000 and rose to 4000 with the addition of materials and equipment suppliers and the press.

The mailing piece itself is in the form of a one-page letter, written and signed by Heater, on such subjects as G-W's "total service" capabilities and its emphasis on quality and precision work. A sample molded piece and a reply card are attached.

After only six mailings, Heater reports, "We've gotten five jobs that can be directly attributed to our newsletter and a phenomenal number of inquiries. We're very pleased with the results."

DSW 588025

STLCOPCB4093361

What processes will be most vital to design engineers in the '70's?

Of 1000 design engineers recently polled by Cahners' Purchasing magazine, 42 percent cited injection molding and 33 percent named extruding. Encouraging figures perhaps, but consider the other processes mentioned and their relative standings:

Machining, 72 percent; welding, 63; stamping, 60; die casting, 39; sand casting, 35; powder metallurgy, 31; N/C machining, 30; forging, 27; investment casting, 20; wire forming, 20; cold-heading, 17; electrical discharge machining, 14; laminating, 14; adaptive controls, 8; laser technology, 8, and chemical milling, 6.

And what are designers most concerned about?

The same survey noted above found design engineers interested in receiving as much information as they can get, as quickly as they can get it. More specifically they are searching for:

More automation in manufacturing and assembly methods, information on the effects of a shift to the metric system, more effective pollution-control equipment and methods, new materials that can withstand unusual stresses, base materials and protective coatings that can stand up under extreme environmental attack and fire-resistant synthetics.

Also mentioned were materials and components designed for cryogenic applications, better insulation methods and materials, smaller and more precise components that can be housed in increasingly compact units, closer tolerances – often out to the fourth decimal place, improved weight-to-strength ratios in all materials, better control devices (with faster response times in the millisecond range), built-in "lubrication for life", nonstick and abrasion-resistant plastics, better methods for packaging electronic components, and more emphasis on decorative and packaging techniques.

Are you easy to do business with?

Some plastics suppliers and processors, without realizing it, lose out on potential business simply because it is difficult or inconvenient for their customers and prospects to get information or specific answers to questions.

For example, is someone always available in your office to handle telephone inquiries courteously and knowledgeably? How promptly are replies sent to those who seek information by mail? How easy is it for your field people to get the answers they need to serve a customer or prospect, or to help solve one of his problems?

Take a tip from the world's largest chemical company, whose latest slogan is "It's easy to do business with Du Pont."

We thought those days were over . . . . . .

. . . . when manufacturers would take a slap at plastics in promoting their products. But along comes Benjamin Electronic Sound Corp., Farmingdale, N.Y., in a recent ad appearing in the New York Times Magazine, asking "Would you let the performance of an automatic turntable ride on a plastic cam?"

"The cam is the heart of any automatic turntable," the ad points out. "That's why the Miracord 50H uses a precision machined, die-cast metal cam. Other $175 record changers use a plastic cam."

Would you, Benjamin, let the success of a heart operation ride on a plastic valve? Would you let the performance of the Lunar Module ride on plastic components?

Notable quote

"Membership in the Plastics Pipe Institute doesn't make one manufacturer's products any better than another's. On the other hand, wouldn't you rather specify the products of a manufacturer who feels strongly enough about the future of his industry to support the technical research, the educational activities and the quality-control efforts of a nationally recognized trade association like PPI?" – Copy in a new advertising program to promote members of the Plastics Pipe Institute, a division of The Society of the Plastics Industry.

DSW 588026

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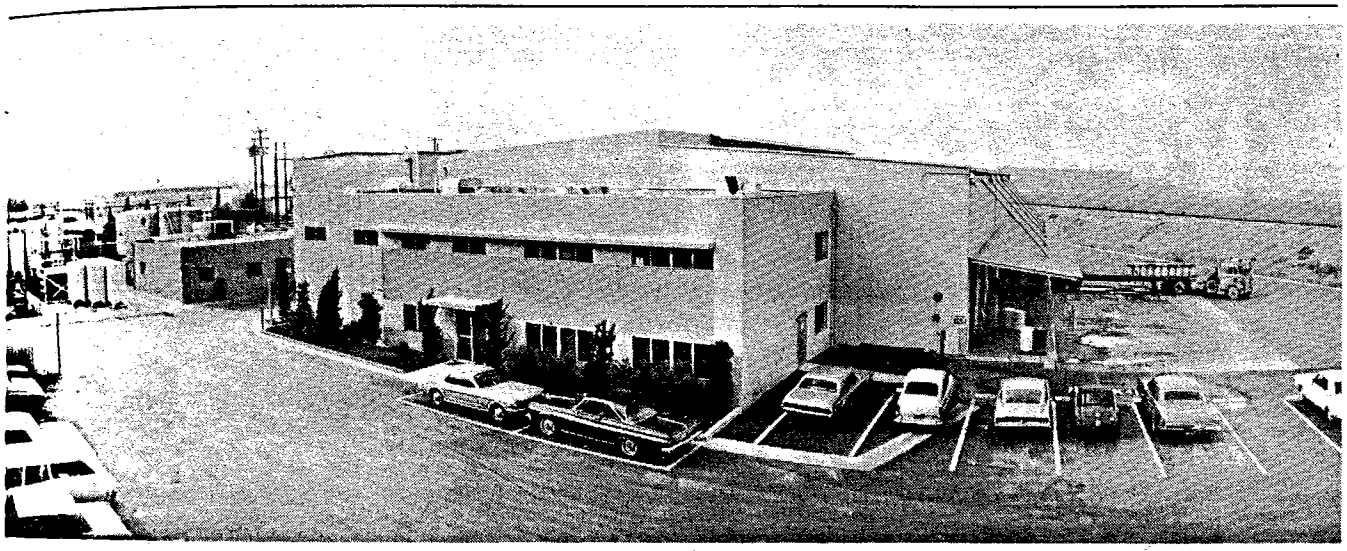

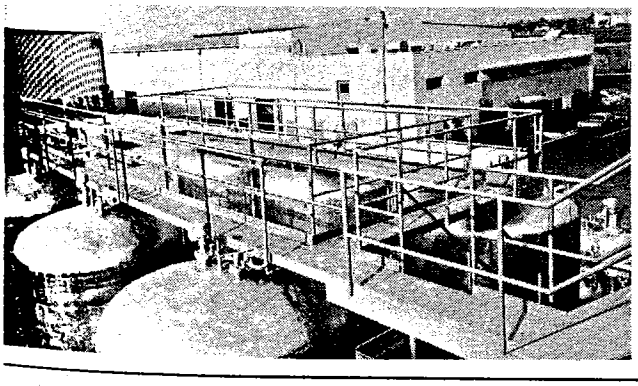

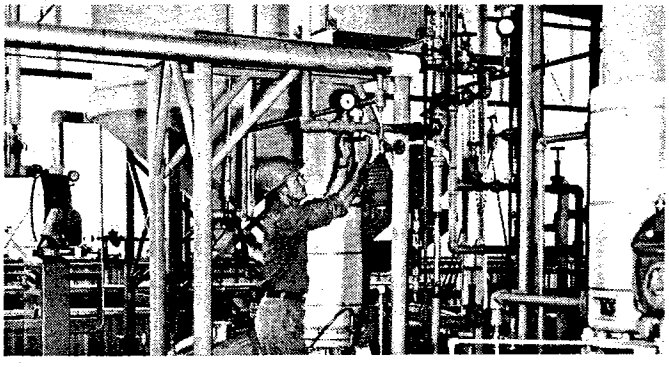

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CIRCLE 17

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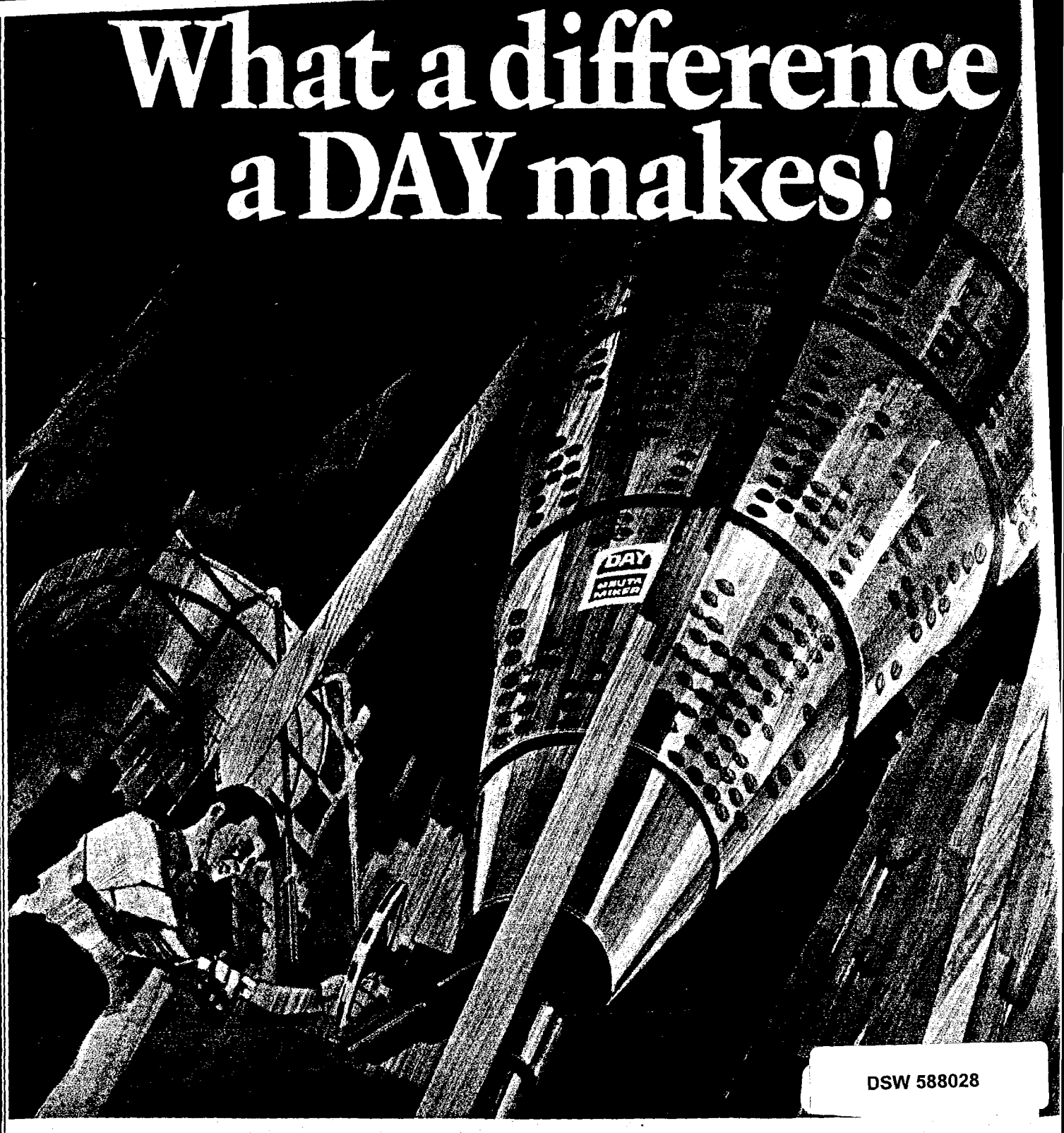

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CIRCLE 18

STLCOPCB4093364

plastics design

ideas from the design board

Plastics aid increased crop yield in soilless farming

Vinyl-film ground cover and reinforced-plastic glazing provide an almost complete plastics enclosure for the hydroponic gardening system developed by Hydroculture, Inc., Glendale, Ariz. These environmentally controlled plastic growing units have a spectacular effect on the growing of cucumbers, tomatoes, lettuce and such fruits as strawberries. Whereas 30 tons of tomatoes/acre are considered good production in field crops, the Hydroculture system yields 120 tons/acre.

The first step in the procedure used to erect a "Magic Garden" greenhouse for vegetable or fruit production involves laying vinyl sheeting in shallow concrete trenches running the length of the rows. Goodyear vinyl sheeting is used because it has proved to be sufficiently tough and flexible to withstand normal installation abuse. Should a hole be punched in it accidentally, it can be patched easily.

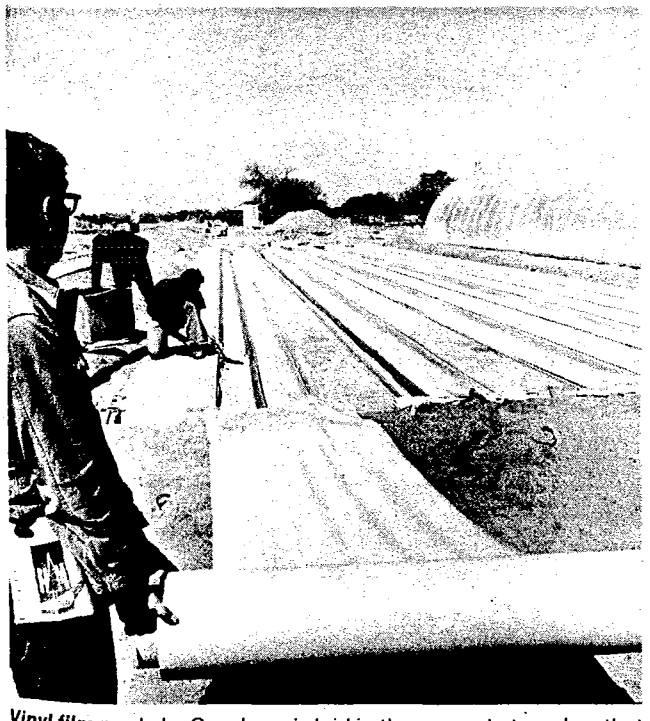
After the trench liners are secured in place, perforated rigid-vinyl pipe is laid in the trenches to provide distribution of the nutrient feed water. Next comes 10 inches of washed and sterilized gravel, which serves to support the growing plants. The vinyl trench liner holds the gravel in place and prevents the nutrient water from escaping into the earth.

With the trenches completely in place, the reinforced-plastic glazing then is placed in position. This involves the erection of steel support members to which the reinforced-plastic panels are secured by exterior tension cables. The reinforced panels are manufactured by the Filon Div. of Vistron Corp. The acrylic-modified polyester resin used in these "Filon Greenhouse Panels" has a service life in excess of 10 years with proper maintenance. The end structures of the greenhouse units that support the heating and ventilation equipment are built from plywood. The structure is capable of withstanding winds of 85 mph.

Hydroculture, Inc. offers two systems for growing food without soil. The "Magic Garden" unit is an automated greenhouse for the growing of various fruits and vegetables. The "Magic Meadow" unit is for growing livestock feed. A succulent feed can be grown in 7 days at a cost of $8/ton. These units are artificially lighted and maintain a 24-hour growing period each day.

The cost of the "Magic Garden" greenhouse measuring 26 by 128 ft is about $20,000. The unit is shipped in knockdown form and can be erected rapidly by a trained crew. To date these units have been shipped to growers in more than 20 states. It is expected that their distribution will soon be increased to cover all parts of the world where the efficiency of hydroponic gardening could be highly beneficial.

A home-garden unit measuring 10 by 14 ft is being developed by Hydroculture, Inc., which is expected to sell for approximately $2500.



Vinyl film made by Goodyear is laid in the concrete trenches that provide the growing containers for the soilless-gardening greenhouse lining erected by Hydroculture, Inc., Glendale, Ariz.



Completed "Magic Garden" greenhouse is shown here with young tomato plants that will produce up to 120 tons/acre. Roof covering is reinforced-plastic paneling manufactured by Filon especially for greenhouses.

DSW 588029

STLCOPCB4093365

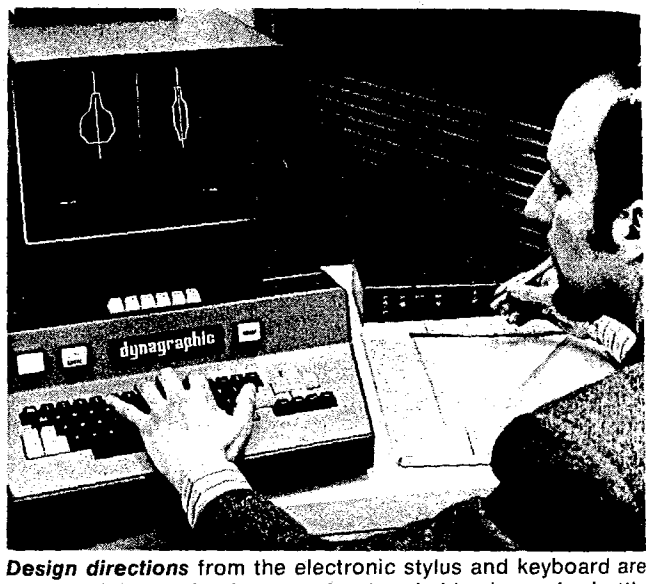
Computer speeds package design

A new tool aimed at assisting packaging people with the creative and technical aspects of package design has been developed by Dynagraphic Computer Design Corp., New York, N.Y. The Dynagraphic system actually replaces the designer's pen with an electronic stylus.

Here is the way its works. The designer inputs lines, curves and cross-section data into the computer by drawing on a tablet with a stylus. Once this graphic information is recorded visually on a cathode-ray tube, whole families of bottle shapes and sizes can be generated quickly. The designer, in turn, is able to edit, delete, widen, lengthen, reproportion or otherwise modify any of the resulting designs.

The computer also is programmed to do essential engineering calculations such as external displacement, internal volume and head space of bottles made from any specified material. When the design has been finalized, the computer will print out dimensioned drawings for model-making purposes.

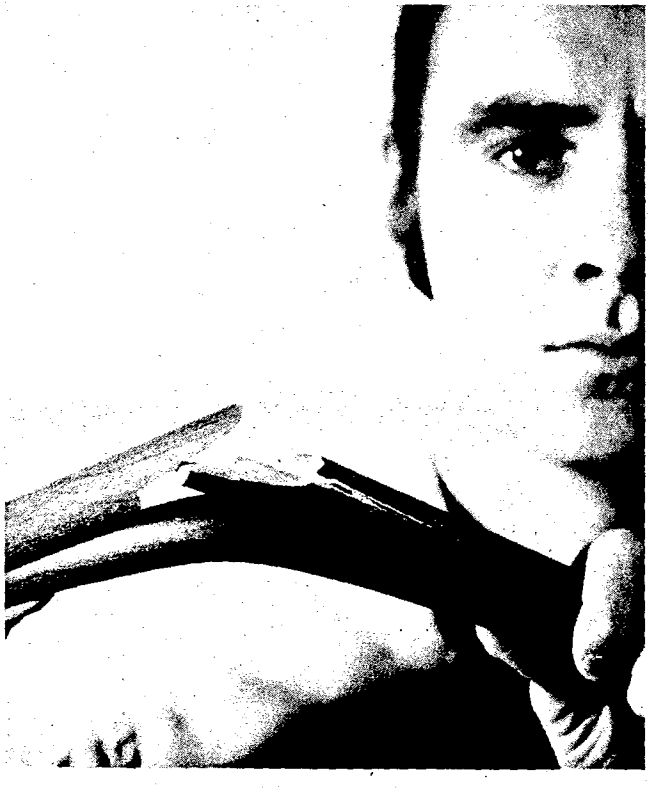
The services of this new packaging design tool can be obtained at a Computer Design Service Center in Manhattan where clients can reserve the use of the Dynagraphic System on an hourly basis. Or, the entire system is available for in-house installation on a yearly license basis. **333**



Design directions from the electronic stylus and keyboard are used to develop simultaneous front and side views of a bottle on the display tube.

Vinyl foam replaces wood

Prefinished extrusions of cellular polyvinyl chloride are claimed to have better performance than wood by the manufacturer, Grossen Corp., Milwaukee, Wis. The new vinyl moldings will not crack, split, warp or shrink and will not show hammer marks from installation. The moldings are available in eight natural woodgrain finishes and six solid colors. At the present time the shapes available include: base, casing, ceiling cove and crown configurations.



Vinyl molding resists flexing that splits wooden counterpart.

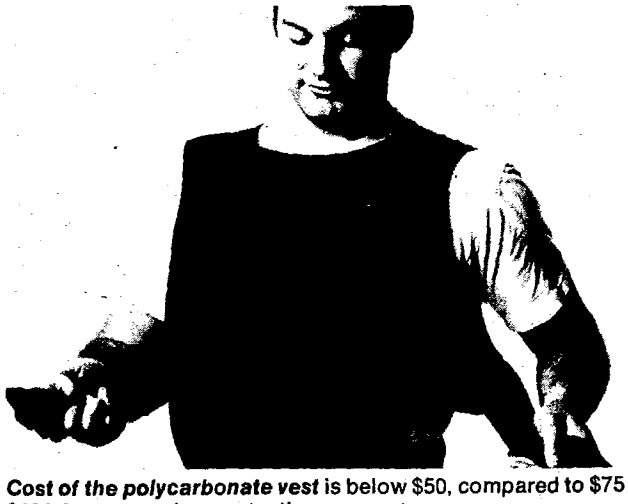
Polycarbonate shield stops hand-gun bullets up to 45 caliber

Now, for the first time, there is a bullet-resistant vest that can take up to five shots in the same area without harming the wearer. It is based on the use of a 3/8-inch-thick sheet of polycarbonate that weighs only 3-3/4-lb. Other types of body armor that would provide similar protection weigh from 7 to 38 lb.

The vest, produced by Imperial Protector Co., Compton, Calif., is capable of stopping hand-gun bullets from 22 to 45 caliber, provided they are not high-velocity magnum guns. Another product, "Imperial Super Guard", consisting of two laminations of polycarbonate with a special core material, is capable of stopping a 44 magnum.

Imperial's vest has been tested by more than 80 police departments who confirm its performance.

The polycarbonate sheet used in the vest is provided by Rowland Products, Inc., Kensington, Conn. "Rowlex" polycarbonate sheet also is being widely used for break-resistant glazing in schools, industrial and store windows. **334**



Cost of the polycarbonate vest is below $50, compared to $75 to $350 for competing protective garments.

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CIRCLE 19

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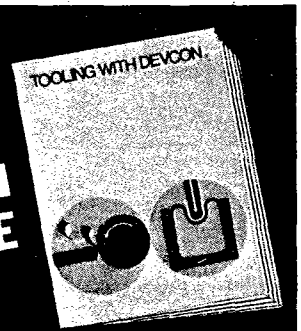

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CIRCLE 20

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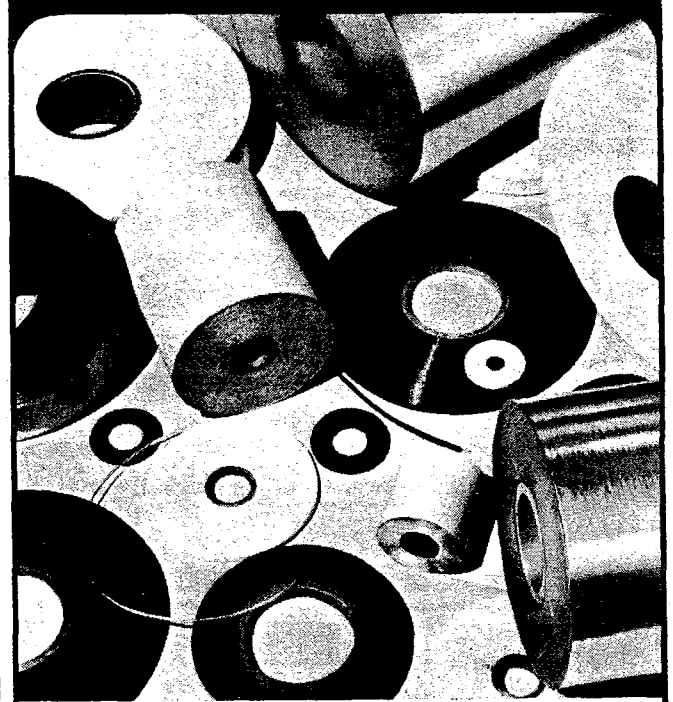

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CIRCLE 21

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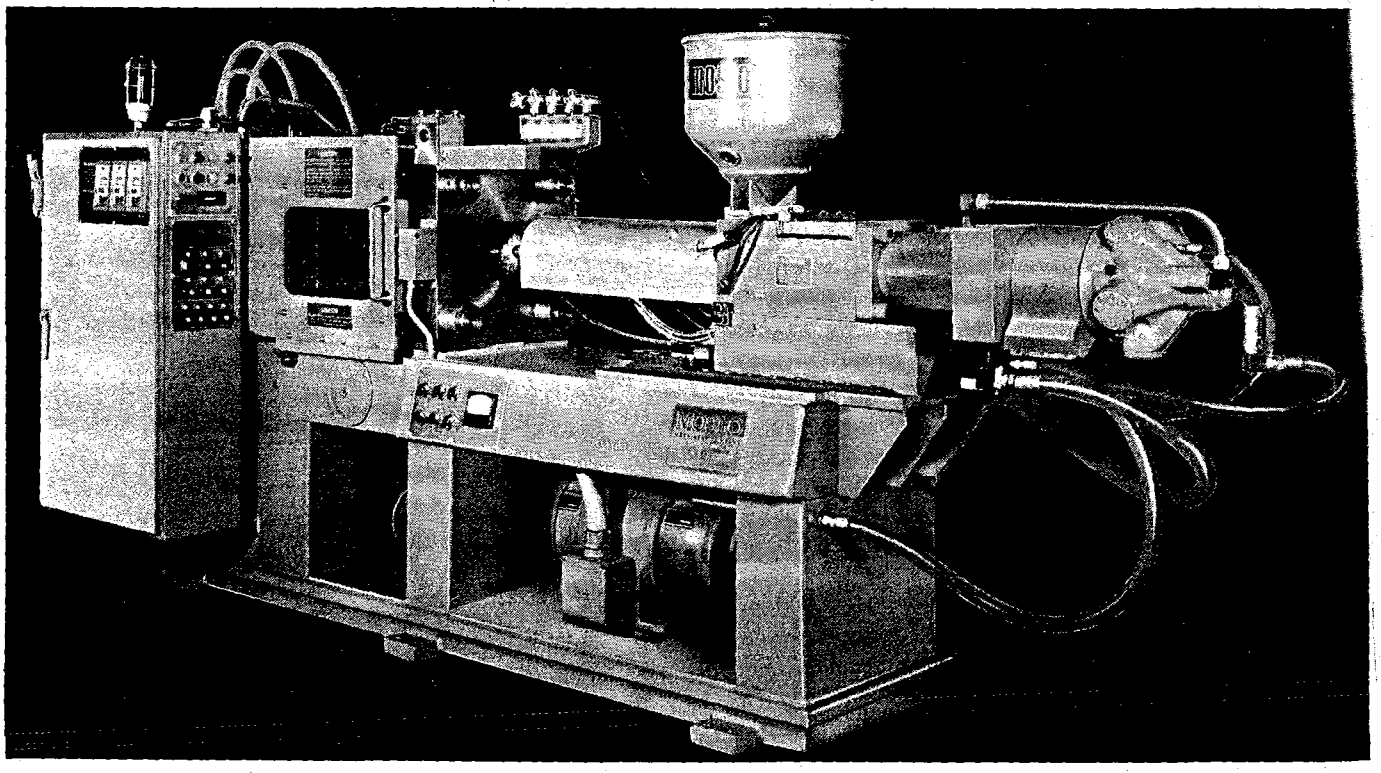
(135T AND 200T CAPACITIES)



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CIRCLE 22

STLCOPCB4093368

plastics output

ideas for production men

Peel-off paint finds defects in plastics parts

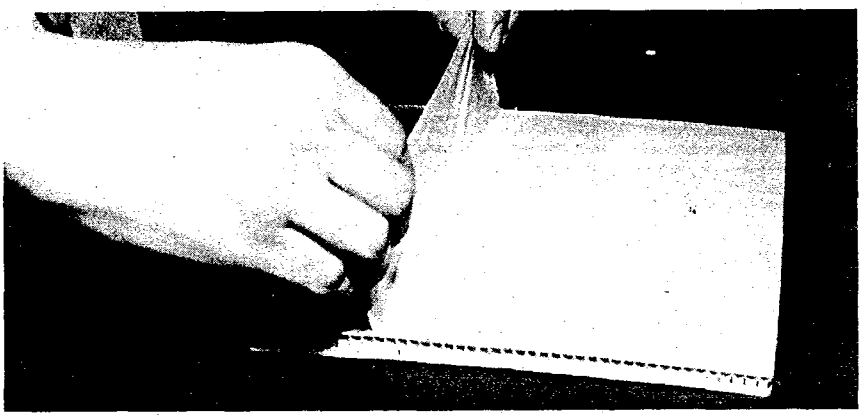
The Air Force has come up with a nondestructive test for plastics parts that involves painting the part, then peeling the paint off like a banana. This test has been found especially useful for locating flaws that could produce structural defects. For example, the test locates lack of bond and presence of water in honeycomb-core composites—defects that have been known to diminish structural properties.

A year ago the Air Force Systems Command's Materials Lab, at Wright-Patterson AFB, Ohio, developed the paint. When applied to samples of aircraft surfaces and subjected to the stimuli of heat and light, the paint changes colors and pinpoints defects in the structures. Now this nondestructive paint has been refined and can be peeled off the structure once testing is complete.

The new paint was formulated by combining photochromic dye with a strippable coating. The paint can be used on all metal, plastic and rubber surfaces that ordinarily are unaffected by methyl ethyl ketone, one of the solvents found in the strippable coating.

The new peel-off mixture offers many useful features. For example, fumes and the mess associated with ordinary paint removal are eliminated and the mixtures dry quicker than paint with just the NDT base.

Once removed, the paint strip can be reused if the same initial adhesive quality is achieved. Since adhesiveness is lost when the paint is peeled off, resticking can be accomplished by using tape, static electricity or a vacuum to assure a good contact.



Nondestructive testing paint peels off part, eliminates fumes and mess associated with paint removal. The test is successful in locating flaws in parts.

Process decorates foams in one step

Need to decorate foam products such as toys, cushions and novelties? If you do, there is a new process available that may solve your need. Gladen Enterprises, Inc., Bay City, Mich. has patented a process that requires no preliminary flame treatment of the surface to be decorated and permits the application of multicolor decorations in a single step. It works equally well on polyethylene and polyurethane foam materials, both flexible and rigid.

The process utilizes a PE film printed on its second surface that permanently bonds to the foam. Preprinted, precut pieces of PE film are laminated to the foam products under moderate heat and pressure. Cycle time averages 10 sec, which allows good productive capacity. Gladen licenses this process, as well as providing the film transfers. This process also is useful for decorating flotation devices. **330**

Nonstick conveyor-belt fabrics improve productivity

PE processors, foam producers and laminators, among others, will find a recently introduced variety of nonstick conveyor-belt materials useful. Now available from Pallflex Products Corp., Putnam, Conn., these materials are sold under the brand name "EMFAB". The industrial-grade glass fabrics, which are impregnated and coated with "Teflon" or silicone rubber, can be used as high-temperature antistick conveyor belts in a wide range of applications. The products, which are chemical-resistant and flexible, can withstand 500F temperature and are available porous and nonporous.

Because of their excellent release qualities, "EMFAB" belts allow manufacturers to make polyurethane foam continuously without the usual expense of single-use release paper. Also, hot, sticky polyethylene does not adhere to these belts.

Said to be ideal for many applications including lamination release sheets, heat-seal covers and work-area covers, these materials come in standard sizes from 0.003 to 0.014 inch thick and up to 48 inches wide. Widths up to 116 inches are available. "EMFAB" also is available with a high-temperature pressure-sensitive adhesive, protected by release paper. Widths range from 1/4 to 36 inches. **331**



DSW 588033

STLCOPCB4093369

Robots increase versatility

Since 1963, industrial robots produced by AMF Versatran, Warren, Mich., have been available as systems capable of five axes of movement. Now these units also are available in simpler, lower-cost versions that provide as few as two axes of full servo-controlled movement. Such programmable, flexible automation should increase the use of robots in plastics processing and in a wider range of industries and factory tasks.

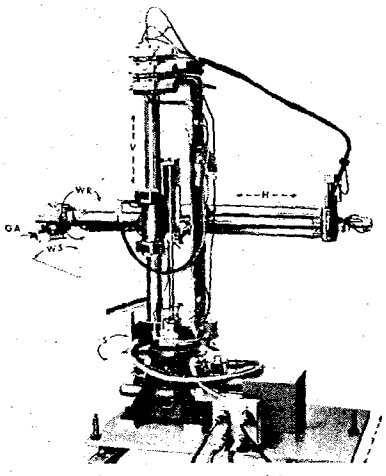
Because of this new option, the user can buy only those automation movements and capabilities that he needs immediately and then can retrofit such a basic unit later to expand its capabilities with additional motions. These new units fill the need for programmable, off-the-shelf automation in such industries as automotive, die casting and others where machine load or unload, or tool-handling operations require fewer movements.

A choice of two different types of programmable controls will continue to be available. Point-to-point (PTP) control is designed for transfer work; continuous-path (CP) control is suitable for complex contouring operations.

The simplest "Versatran" now will be the Model HV with a tooling-equipped arm capable of 30-inch stroke in horizontal and vertical axes. The Model HVS adds a 240-deg swing capability in the horizontal plane. Load capacity ranges up to 150 lb, including tooling. All units have separate hydraulic power packs.

The new simple "arms" also may be equipped with "wrists" that can rotate and sweep to orient and position parts. These movements can be augmented by servo-controlled traverse of the entire mechanical handling unit along tracks or ways.

The modular system approach provides the user with options in specifying not only minimum movements but other equipment as well. If he has an in-plant hydraulic power source meeting specifications for "Versatran" operation, he can eliminate the power pack. If he needs only simple tooling, he can eliminate components in the console. **332**



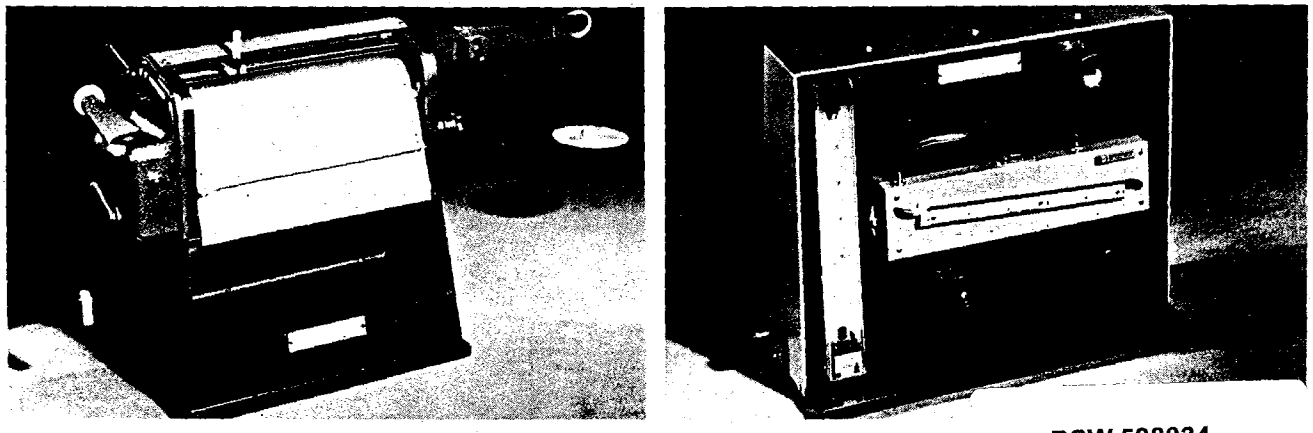
Robot unit now comes with two to six axes. Simplest mechanical unit can consist of machine column, V, and handling arm, H, for vertical and horizontal movements. The spider-like base can be mounted in a variety of work configurations. A third axis, S, permits entire column/arm assembly to swing through 240 deg. Fourth axis is gained through WR, wrist rotate, at the end of the arm, to which gripper can be mounted. Fifth axis results from addition of WS, wrist sweep. Six axes are obtained when the entire five-axis handling unit is mounted on wheels or rollers riding on tracks or ways, T, to permit servo-controlled traverse. Additional movement can be built into special grippers, GA, that can rotate or translate. Handling unit is located in the work station and is powered by a remote hydraulic power unit. Actions of the robot are commanded automatically by a remote console with either a point-to-point or continuous-path programmable control. Cost of the two-axis unit is about half the cost of the full-range "Versatran".

Devices reduce urethane-foam processing waste

Two instruments made by Hampden Test Equipment, Ltd., London, will help urethane-foam processors to decrease manufacturing waste. The equipment measures processing characteristics, thus preventing waste from urethane-foam production runs not meeting specifications and insuring the consistency of new batches before production starts.

The Hampden risograph tests the effects of untried silicone oils and tin salt catalysts by measuring rising time and top collapse of foam to an accuracy of within ±1 percent. Basically it comprises a pen chart recorder and a metal plate that, set above sample batches of mixed chemicals, influences the recording as the foam rises. Overall dimensions are 29-1/2 inches wide by 13-1/4 inches high by 7-1/4 inches deep.

The Hampden porosity tester allows a quick check on the proportion of open to closed cells contained in a piece of finished foam, thus insuring the consistency of different batches. It has a sample holder, a manometer and a flow meter mounted on a metal frame.



Risograph (left) and porosity tester (right) measure urethane processing characteristics. **DSW 588034**

STLCOPCB4093370



Lay that pistol down, Frank.

"Now who'd have the brass to try to outshoot Big Frank?" wondered the members of the Cincinnati Schutzenbuckel, or shooting club, on that crisp November afternoon in 1876. Frank Butler was the best marksman in the territory. Been setting records for years.

Today was the clubs annual sharpshooting contest, and Butler grinned confidently as he strode to the gun rack. He'd make mincemeat of whoever the durn fool competition committee put up agin him. Always had. Always would.

A barefoot pigtailed girl in a tattered dress stood near the guns. "Scoot, Halfpint," scolded Butler. "Them's dangerous weapons. You could git hurt."

The head of the competition committee took his arm. "Frank," he said, "this here's your challenger from upcountry."

"Why the rifle's taller'n' this chee-ild," snorted Butler.

Too shy to respond, the girl lifted a gun from the rack, and stepped to the shooting line. "Pull," she called.

A clay pigeon arced out and her gun swung to her shoulder. "Hit," cried the referee.

Next shot was Butler's. "Miss," cried the referee.

The contest called for 25 shots apiece but it was clear from the start who was champion. That little girl from Darke County, Ohio, barely 5 feet tall and weighing 98 lbs., could hit a playing card at 50 paces firing over her shoulder. She could shoot a lighted cigarette from a mans mouth, from the back of a galloping pony. She was Annie Oakley, who years later, as star of Buffalo Bill's Wild West show, became known throughout the world as the greatest woman sharpshooter ever born.

We were small fry ourselves when we first hit the plastics business.

But we knew what we were aiming for and when the chance to prove it came along we were right on target.

Today, after 51 years in the business Foster Grant has grown used to knocking off the biggest jobs. But we haven't gotten too big for our britches. So even if it isn't something big, call us.

We'll never act like big shots.

If you remember Annie Oakley don't forget Foster Grant.

DSW 588035

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CIRCLE 23

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Reproduce the most intricate polyester parts. New Silastic G silicone rubber.

Silastic® E RTV moldmaking rubber set the standard for high-quality wood-simulated polyurethane components. Now Dow Corning gives you Silastic G RTV silicone, a high-strength, noninhibited-cure rubber for intricate polyester castings.

Furniture manufacturers who use plastic components rely on Dow Corning for product-improving innovations like Silastic® G rubber.

It minimizes mold contamination—gives you more parts and better parts per mold. Its free-pouring consistency penetrates even the narrowest crevices.

Besides supplying the most complete line of moldmaking rubbers, Dow Corning offers new 509 Barrier Coat. It extends the life of silicone rubber molds and enables cast parts to be finished with no additional surface preparation.

Write for a free brochure to Dow Corning Corporation, Dept. A-0371, Midland, Michigan 48640.

Moldmaking materials from

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DSW 588036

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Move

to greater efficiency with a direct hydraulic inline screw drive.

All FS-SERIES injection molding machines utilize an advanced design reciprocating screw which provides a high plasticizing rate for a wide variety of thermoplastics. A unique low speed motor produces maximum torque throughout its complete RPM range, offering silent and dependable operation. The inline ram design also eliminates the necessity for gear reductions and thrust bearings.

A complete selection of thoroughly tested screw designs (including thermoset design) are available for specific customer requirements.

The screw speed and torque on all machines are infinitely adjustable throughout their range, and are controlled by means of conveniently located, pressure-compensated flow valves.

To prevent nozzle drool, melt decompression is standard on all FS-SERIES machines.

Utilizing U.S. Standards throughout, the FS-SERIES offers low cost replacement of parts that are readily available throughout the country. Complete factory facilities allow for dependable warranty and maintenance services.

Our entire line of reliable, fast cycling machines gives you quiet, smooth operation with shot capacities from 2-60 ounces and clamp tonnages from 55-550 tons. On request, other clamp capacities up to 5000 tons are available.

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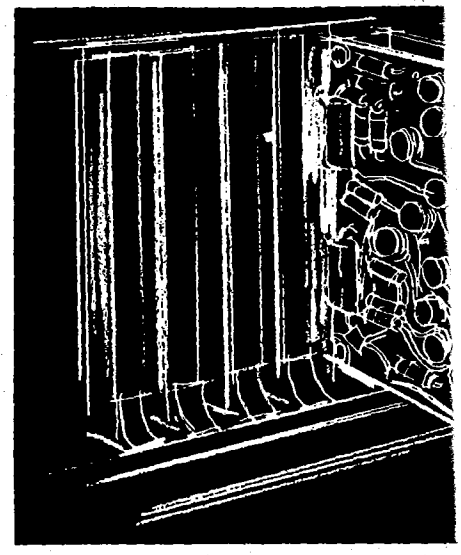
CIRCLE 25

STLCOPCB4093373

Dion FR® resins: the most effective fire retardant polyesters save more than a fire.



Tests show Diamond Shamrock's Dion FR polyesters to be the most effective fire retardant resins available, today. For example:

Eight ounce translucent fiberglass reinforced building panels made with Dion FR 6114 have a Class I UL flame spread rating of 25—an industry first.

Dion FR 6692 meets U.S. Navy and Coast Guard specification MIL-R-21607B, passing both Grade A and Grade B MIL-R-7575C physical requirements. What's more, this resin maintains 100% fire retardancy after two years of weathering tests.

Dion FR DRA-604, an intermediate FR grade resin with a Class II flame spread rating at lower cost, qualified recently for use in San Francisco Bay Area Rapid Transit cars.

The most effective fire retardant resin can also save you money. Dion FR resins cut costs two ways: First, for hand lay-up or spray-up, intermediate grade Dion. FR DRA-604 offers Class II flame spread rating with 9¢/pound savings over our Dion 6692 premium grade resin. Class I flame spread rating can be achieved with addition of 5% antimony trioxide.

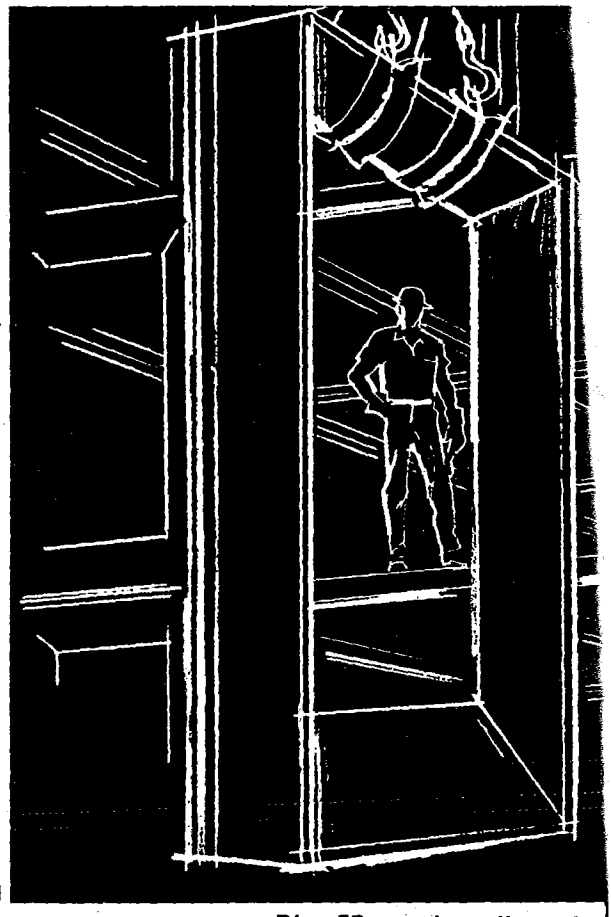
Second, for matched-metal die molders, Dion FR 6399 and DRA-308 polyesters, can be blended with higher filler loadings to meet specifications at lower cost.

Dion FR polyesters can replace other materials economically. In a variety of materials applications, fiber reinforced plastics offer higher strength to weight ratios than existing products, creating new solutions as suggested here.

And we can help, by engineering one of our family of Dion FR resins to meet your specific requirements.

For more information, write Resinous Products Division, Diamond Shamrock Chemical Company, 300 Union Commerce Building, Cleveland, Ohio 44115. Sales offices: 175 Schuyler Avenue, North Arlington, N. J. 07032; 1901 Spring Street, Redwood City, California 94063; 4814 Loma Vista Avenue, Los Angeles, California 90058.

Diamond Shamrock Chemical Company



Dion FR curtain wall panels meet fire codes, help cut construction costs. Lightweight FRP panels for hi-rise buildings can speed construction. And Dion FR translucent or filled panels meet Class I flame spread requirements. Other building industry applications: Dion FR 6114 and 6125 for skylights and warehouse siding; Dion FR 6692 and DRA-604 for aggregate-filled building fasciae and composite FRP skin/polyurethane foam core low-cost housing panels.

DSW 588038

STLCOPCB4093374

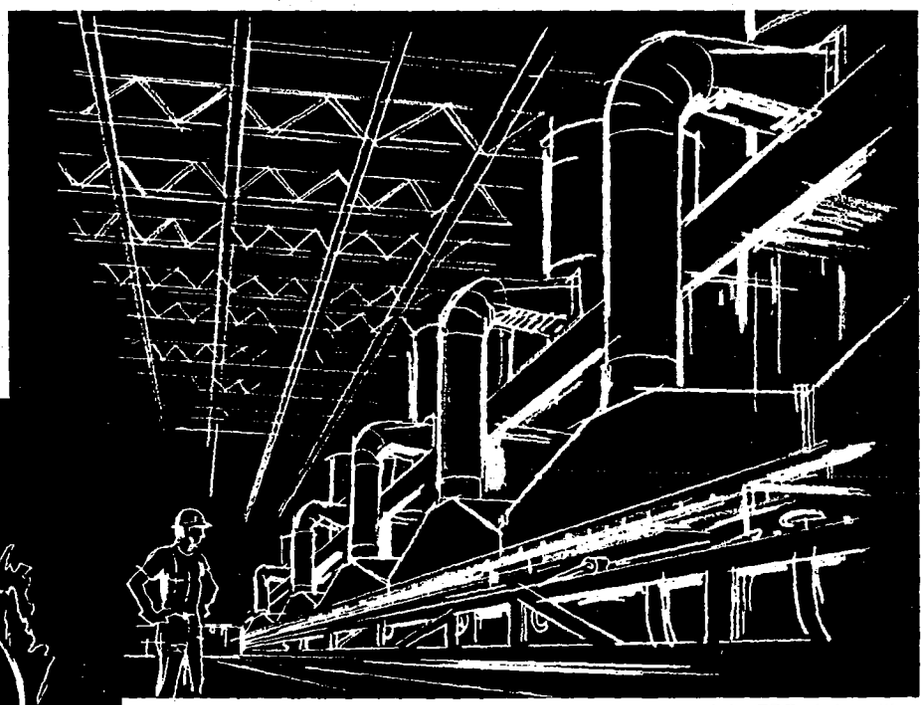


Dion FR can keep a hot new computer from doing a slow burn. Make its laminated circuit boards with a Dion FR resin. A Dion FR resin plus low-cost filler can save money over formulations now in use. That goes for FRP appliance and business machine housings, too.

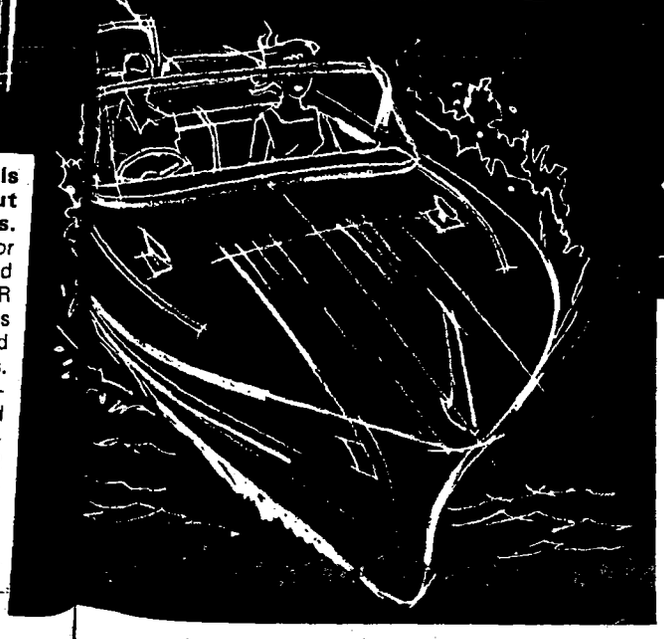


Dion FR can lighten the transit load. By replacing traditional metal parts in rapid transit cars—seating, interior paneling, and car ends—fiberglass-reinforced Dion FR can save money. Dion FR DRA-604 is the lowest cost resin to meet New York Transit specs. Other uses for Dion FR resins worth looking into: lightweight truck cabs, cargo containers, automobile bodies.





Dion FR fights air pollution. Lightweight FRP air handling equipment fabricated with antimony trioxide filled Dion FR DRA-604 or Dion Cor-Res 6693 FR meets Class I flame spread rating and required chemical resistance. Ideal for hoods, ducts, fans, fume scrubbers. Can also be used in fiberglass grating for industrial catwalks.



Dion FR can be a lifesaver. Dion FR polyesters in FRP boats substantially reduce hazard of fire at sea at a modest increase in cost. And this small investment could mean improved fire safety and reduced marine insurance rates.

CIRCLE 26

DSW 588039

STLCOPCB4093375

New from Chromalox®... the most advanced high watt-densit cartridge heater in the industry.

The new Chromalox Type CIR eliminates the two most common failure points of cartridge heaters—1) at crimp connections where solid terminal pins and flexible lead wires meet, and 2) where the solid pins enter the cartridge body.

The flexible lead wires in the Chromalox CIR run continuously through the body of the heater right to the point of power connection. There are no crimp connections to fail or pull apart. And the insulating sleeves are imbedded in rock-hard ceramic. There are no solid pins to expose when bent. Insulation remains in place no matter how the lead wires are positioned. A patent is pending for this new, exclusive construction.

With the Chromalox CIR Cartridge Heater you'll ha fewer lead wire failures, less maintenance, neater wiring, more dependable service and longer periods of uninterrupted production.

Get complete information in the new Chromalox Cartridge Heater Manual—Bulletin PC104.

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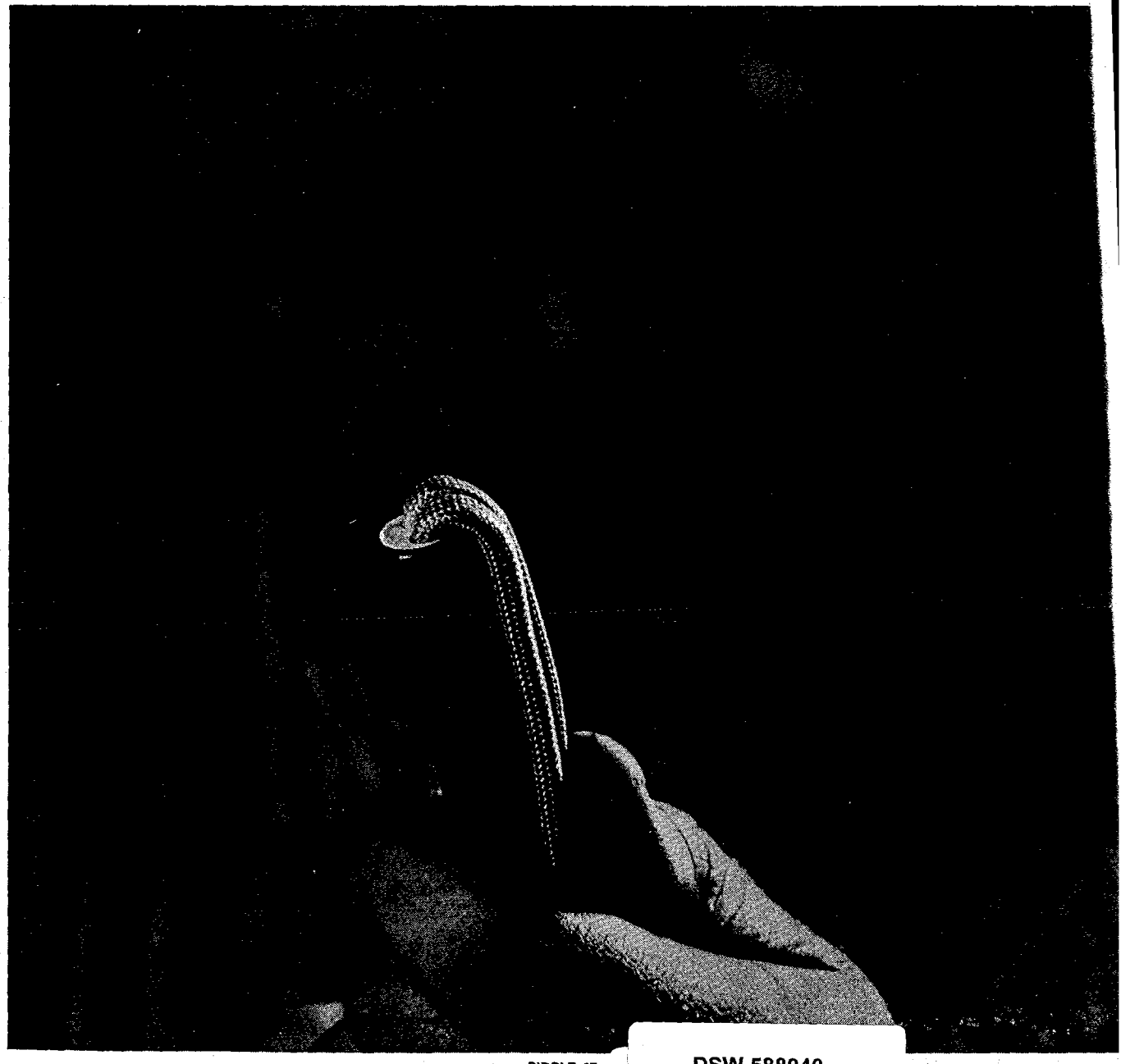

CIRCLE 27 DSW 588040

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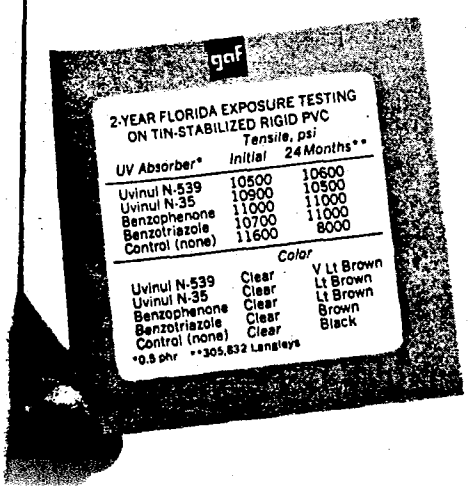
Want a UV absorber in your vinyls, but not a color?



Uvinul® N UV absorbers—ideal for use in clear, colorless products such as the flexible vinyls shown above.



If the colors of your vinyls are critical, here's an unusual series of acrylic UV absorbers you ought to look at.

It's the Uvinul® N series—the lowest-color UV absorbers available for use with flexible and rigid vinyls.

Uvinul N-35 (solid) absorber and Uvinul N-539 (100% active liquid) absorber have very low initial color—won't add unwanted color to even the lightest formulations.

And outdoor studies have shown they effectively resist color change on aging.

Note, also, these other advantages of Uvinul N absorbers:

They're effective—proven in extensive two-year outdoor tests (see Table at left.)

They're permanent — won't exude. Outlast most plasticizers.

They're non-reactive—won't react with metal stabilizers.

They're lower cost—on a cost/performance basis, Uvinul N absorbers can save about ½¢ per pound of resin over benzophenone and benzotriazole absorbers.

So if you mold, cast, calender, extrude or coat vinyls—or if you synthesize the resin itself—evaluate Uvinul N UV absorbers.

Send for a sample and technical data.

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Uvinul® N-35 ☐ Uvinul® N-539
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The 60-second everything.

D·M·E STANDARDIZATION CAN DO IT FOR YOU

A 60-second phone call to your nearest D-M-E branch gives you everything you need but the cavity.

Your branch can supply D-M-E standard mold bases in more than 11,000 size combinations. Cavity insert rounds and blocks. Collapsible cores. Components of every kind. Special machining service.

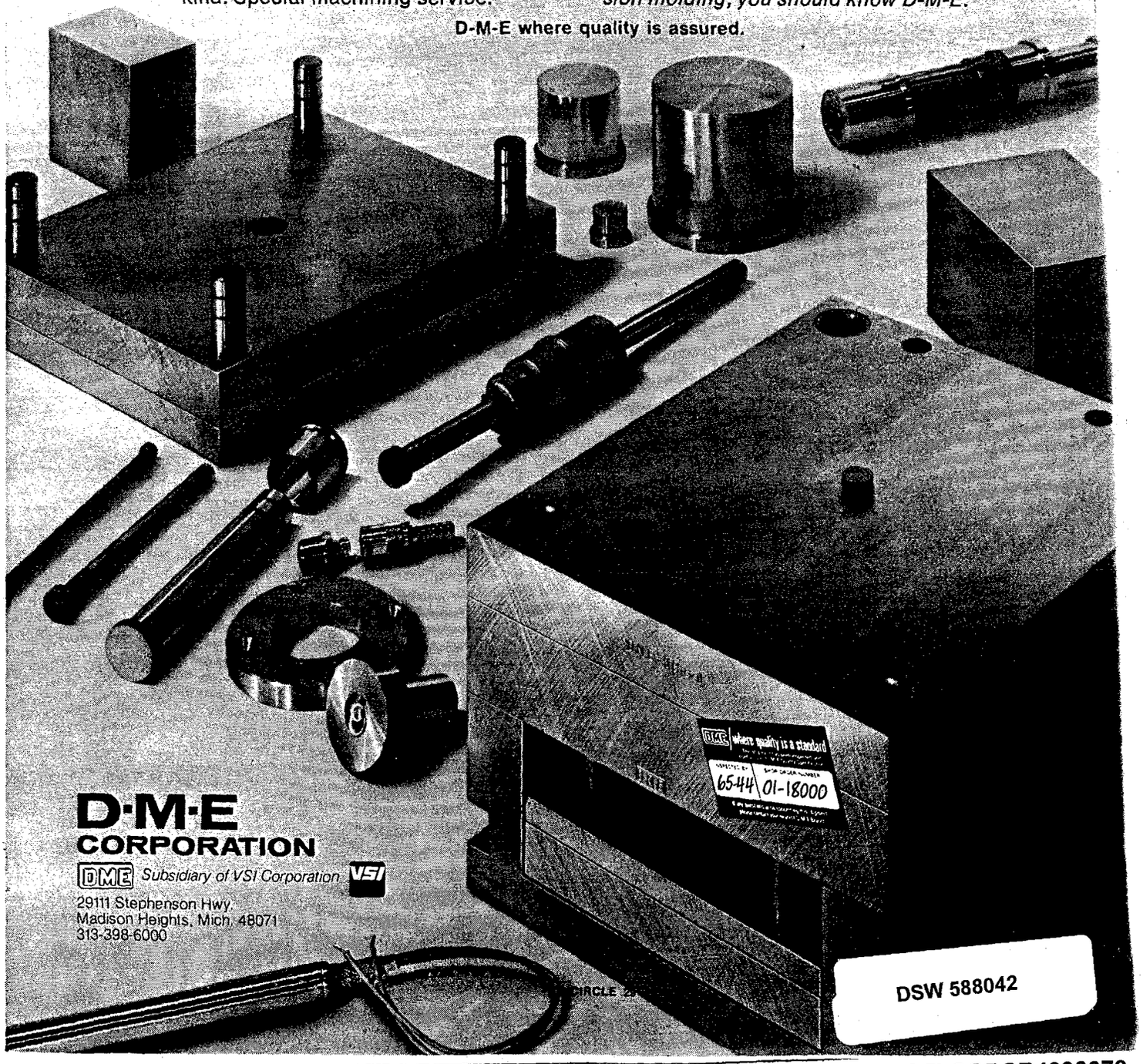
Everything you need, for less than it costs to build it yourself.

When you work with D-M-E, you free your moldmakers to concentrate on cutting cavities, which increases their efficiency *and* output.

Call. Your nearest D-M-E branch is in the Yellow Pages under "Molds." Branches are located throughout the U.S., and in Canada, Mexico and Europe.

If you're interested in injection or compression molding, you should know D-M-E.

D-M-E where quality is assured.



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STLCOPCB4093378

PLASTICS & ECOLOGY



Where do we stand—ecologically? The plastics industry is being squeezed hard between the irate environmentalist and the protective legislator—and it hurts! See page 42.



What should be done—technologically? Plastics disposal R&D is building as part of a solid-waste system, but a new technology-transfer program also is needed. See page 51.



What action must we take—immediately? Everyone must take ecological action now! If you need a reason to act: eventually you will be hit in the pocketbook. See page 59.

DSW 588043

STLCOPCB4093379

Where do we stand—ecologically?

Right now we're being squeezed between irate environmentalists and protective legislators—and it hurts!

Over the years the plastics industry has been buffeted by relatively minor problems—a few recessions, diminishing profits, plastic-bag hazards, a reputation for toys that fall apart, a poor industrial safety record and other obstacles to growth.

But the impact of the ecological movement on plastics is something else again! Never really having faced a major crisis before, the plastics industry now has its fast-graying hair full of ardent environmentalists, stern legislators, aggressive students, influential members of the press, radio and TV, and other self-styled ecologists. Unfortunately, much of the criticism leveled at plastics arises out of emotion rather than fact.

In a recent attempt to identify current industry problems, The Society of the Plastics Industry asked its members via questionnaire to single out the most serious problem facing the industry today. Those answering were requested to exclude ecology from their comments. It was a foregone conclusion that the ecological issue was far and away the most vital problem the industry faced today. In fact, as an SPI staff member commented, "The ecology issue is the most serious and potentially damaging problem that ever challenged plastics."

What are the critics saying? Here are a few samples from SPI files:

Time, in an article on disposable medical supplies: "But the PVC . . . plastics may generate lethal fumes containing hydrochloric acid and phosgene, a poisonous gas once used in chemical warfare. Other plastics melt and clog incinerators."

Sue Hoover, in the Detroit News, in an article on PVC: "Polyvinyl chloride (PVC), a minor but growing part of the plastics industry, has been found to give off hydrochloric acid and phosgenes as by-products unless it's burned under just-right conditions. The hydrochloric acid can corrode an incinerator and irritate respiratory systems . . .

Jim Jensen, WCBS-TV (New York) in a documentary called "Don't Drink the Water and Don't Breathe the Air": "Garbage burning is a source of air pollution, largely because of plastics made by industry. Plastics do not decompose, so we are making millions and millions of containers that will be around for thousands and thousands of years unless we burn them, which we shouldn't do either because in combustion they release acids and other very harmful substances."

These and other statements compiled



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by the SPI are representative of the types of unqualified utterances that prevail at influential levels. While PVC is referred to most often as the prime polluter in these kinds of statements, polystyrene has come in for its share of lumps, too.

Pressure on polystyrene. Many supermarket managers and owners throughout the country have switched from PS meat trays and egg cartons back to pulp and cardboard as a result of pressures applied by consumer groups. For example, in Evansville, Ind., a housewife who attended a pollution seminar at Indiana State University heard a professor speak on the ill effects of burning polystyrene. Disturbed by the comments, she wrote to the owner of two supermarkets in Evansville, suggesting the use of cardboard rather than PS cartons to prevent emissions of poisonous gases when the packaging ultimately was burned. The owner agreed to use up his existing stock of PS-foam egg cartons and return to cardboard where possible.

In another incident involving PS egg cartons, the outcome was a bit different. Late last year, a Canadian environmental group, Pollution Probe, comprised of University of Toronto professors and students, called for a voluntary ban on polystyrene packaging in Ontario. Here is the way SPI reported on this happening in its Plastics and Environment newsletter, dated Dec. 18, 1970:

"Probe's argument for a ban on polystyrene packaging was familiar. Polystyrene gives off heavy black smoke when burned in the open air. To prove the point, they burned cartons made of pulp and of expanded polystyrene, and noted the white smoke given off by the pulp carton as opposed to the black smoke from the polystyrene.

"They also obtained a statement from the Air Management Branch of Ontario's Dept. of Energy and Resources Management to the effect that Toronto's incinerators are outmoded and might give off odors from burning polystyrene.

"SPI-Canada discussed the matter with officials of the Air Management Branch and received a letter with the following significant passage:

'A review of the quantities of this material presently in municipal waste and of present incinerator practices indicates that there should not be an adverse air-pollution effect. It is estimated that the volume of this type of plastic . . . can be increased several times before a cognizance of their presence in municipal wastes requires attention.

'This matter, however, should point out to all concerned that thought should be given to the impact on air quality when introducing any new product that may be incinerated. It is the intention of the Air Management Branch to keep abreast of the growth of volume of those plastics that may be incinerated.'

"SPI-Canada issued a press release



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pointing out that polystyrene is not harmful to the environment when properly incinerated or used in sanitary landfill. The statement also quoted the revised opinion of the Air Management Branch.

"Subsequently, officials of Probe issued a second press release recommending that the plastics industry work toward recycling of plastics. It said, *'We congratulate The Society of the Plastics Industry for checking with the Air Management Branch of the Ontario government to see if polystyrene can be adequately disposed of in Ontario. They have set an example that we hope other industries will follow . . . We are happy to lift the voluntary halt in Ontario to polystyrene containers that we asked for.'*

These isolated examples pulled from SPI literature are only the tip of the iceberg—publicity on PVC, styrene and other polymers has been widely distributed in environmentalists' newsletters and throughout the consumer press. Not only has this publicity hurt sales of certain plastics packaging—one supplier of styrene-foam meat trays reports business off 75 percent—but it also has produced a crop of legislation designed to restrict plastics and other disposable packaging.



Legislative pressures. Bills that would ban, tax or require deposit on disposable packages have cropped up in more than 20 states during the past year. This legislation ranges from an outright ban on disposable containers (Hawaii, H.B. 89), to a deposit on plastic bottles (Nevada, $0.05 deposit per S.B. 22), to bills that require filing of a recycling plan (Colorado, S.B. 62) and taxation of disposable containers (Kansas, $0.01 tax, H.B. 1317). At the time of this writing, the plastics industry is struggling with a proposed ban on PVC containers in New York (S.B. 3326 and S.B. 3492)—the outcome of this bill will be significant. Other heavily populated states considering similar legislation include California and Illinois.

Although it's a pretty safe bet that much of this legislation will never see the light of day—some of it already has been shelved—the point has been made. Plastics could face restrictions in application that could shrink certain markets. In parts of Japan, where the percentage of plastics in the solid waste load is upward of 10 percent, bans have been imposed on certain types of packaging until municipalities update incineration systems to handle the load. On the other hand, several European countries have been effectively incinerating plastics—PVC included—for years and converting the thermal energy output to power generation.

Here are the facts. Having seen what the critics are saying about plastics as a menace in solid waste, here are the facts as they have been developed by SPI and others.

Ten years ago, an average citizen accounted for about 2 lb of refuse per day. The average has now grown to 5-1/2 lb per day per person. Industrial and agricultural waste has been increasing at an even faster rate. Livestock and poultry waste production is 11 times the amount of human waste. Refuse generation per individual is growing 4 percent a year—so by 1980 the average American will generate more than 8 lb of solid waste a day or about 1-1/2 tons per year.

In 1970, Americans threw away 8 million television sets, 7.5 million cars and trucks, 50 billion cans, 30 billion glass containers and 5 million tons of plastics. In all, 3.7 billion tons of solid waste were discarded. Eighty-five percent of this solid waste is disposed of in open dumps that total 7000 sq mi in area (more than Connecticut and Rhode Island combined). Plastics comprise only about 2 percent of the country's municipal refuse. The figure rises to as much as 5 percent in certain urban areas because of the greater quantity of convenience-packaging items used. All packaging materials constitute about 13 percent of our collected refuse.

Facts about PVC. The following several paragraphs are taken from SPI's booklet, "The Plastics Industry and Solid Waste Management", and represent authoritative data developed by universities and member companies on the controversial resin, PVC.



DSW 588046

STLCOPCB4093382

Bills that would ban, tax or require deposit on disposable packages have cropped up in more than 20 states during the past year.

"The properties of polyvinyl chloride in incineration have been seriously misunderstood. Contrary to much erroneous comment, hydrogen chloride (HCl) as a by-product of PVC is a negligible air pollutant and its effect in incinerator corrosion has been exaggerated. In the U.S. the total production of all PVC is less than 0.6 percent of all municipal refuse, and only a fraction of this is incinerated. The overwhelming proportion of PVC is used in durable products designed for long service, such as wire insulation, floor coverings and water pipes.

"PVC also has been said to produce phosgene gas. In fact, the amount of phosgene resulting from the burning of PVC is so minute as to be virtually nonexistent. Measuring techniques refined to 1/10 ppm do not identify phosgene when PVC is burned, according to studies at the University of Michigan.

"A certain amount of internal corrosion takes place in the operation of any incinerator. Modern incinerator technology, however, has greatly minimized corrosion. Many respected European and American authorities believe that proper design and operation can almost eliminate corrosion in incinerators regardless of materials burned.

"There is in fact little known about many of the chemical processes that occur inside an incinerator. This has given rise to much misinformation about corrosion. Polyvinyl chloride, for instance, has come under attack as a major agent of corrosion and air pollution in incineration. When PVC is burned it liberates a certain amount of hydrogen chloride, an acidic gas. If moisture is present, the gas can combine with it to produce hydrochloric acid, which is highly corrosive. But nearly all components of refuse give off harmful gases, and all organic materials do. In ordinary incinerator refuse, there are many materials besides PVC that produce HCl and other chlorides, among them food wastes, grass, leaves, shrubbery, paper and salt.

"At present, there is simply insufficient evidence at hand to warrant criticism of burning PVC or other plastics as the major causes of incinerator corrosion. It is the judgment of the industry, however, that the additional quantities of PVC that will be incinerated in the next few years will not significantly increase corrosion in incinerators."

SPI has had to combat unfounded criticism from groups concerned about plastics and air pollution. Here is what SPI has to say on this important subject:

"Inefficient incineration pollutes the air. Efficient incineration produces little or no air pollution. What about plastics as a factor in air pollution? Once again, a discussion of PVC is necessary, since it has been criticized as an air pollutant because of its HCl content.

"Plastics are organic materials, and all organic materials give off toxic gases when burned, principally carbon monoxide and carbon dioxide. PVC also gives off HCl.

"According to the National Air Pollution Control Administration, the largest sources by far of HCl in the atmosphere are coal-burning and metal-treating. Yet HCl from all sources is such that a small component of air pollution that it is either not reported in standard samplings or is found only in trace amounts.

"The major U.S. air pollutants are carbon monoxide, sulfur oxides, hydrocarbons and gases containing nitrogen compounds. Government estimates assign the causes of 60 percent of our air pollution to automobiles, 17 percent to space heating, 14 percent to electric power plants and 3 percent to refuse disposal."

Polystyrene in incineration. To round out facts on incineration, it's worth while quoting SPI's booklet further to cover polystyrene:

"Polystyrene also has been criticized as an air pollutant—primarily in its use in convenience packaging like meat trays and egg cartons—because it produces black smoke and soot when burned. In fact, the gases emitted from burning polystyrene are no more toxic than those produced by burning any organic material. Soot from burning polystyrene is carbon black in particulate form. While this is unpleasant, it is not toxic. In modern incinerators carbon black remains in the furnace and is consumed along with other particulates."

Types of disposal. It is expected that incineration will be widely used for solid waste disposal in the immediate future and that open dumping will increasingly wane. More than three-quarters of all municipal refuse is discarded in open dumps presently, according to the U.S. Public Health Service. In addition to wasting valuable land, open dumps are fire and health hazards and de-



DSW 588047

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tract from natural beauty.

Sanitary landfill. "This method has a number of positive features," says SPI. It is truly sanitary if properly employed, it is economical and it often results in the upgrading of submarginal land for recreational or commercial uses. Where land is available, landfill is an excellent solution to waste-disposal problems. Only about 10 percent of the country's refuse is disposed of in this way. Plastics make a suitable component of sanitary landfill. Since they do not decompose readily, they release no odors, gases or liquids that can pollute surrounding land, air or water."

Recycling—yes or no? At the present time no plastic materials are being recovered from dumps or municipal refuse. Difficulty in sorting out the various types and cleaning them for reuse prevents formation of market opportunities at this point. With respect to the conservation of natural resources, however, it should be noted that all chemical products, of which plastics make up only a small portion, account for approximately 5 percent of petroleum used yearly in the U.S. The lion's share of petroleum products go to energy production.

If efficient incineration systems were now in use in this country, the high Btu output of plastics during combustion could be converted to energy for power generation. This should be thought of as a form of recycling. While it doesn't result in a tangible product, output of energy from plastics combustion can be translated readily into dollars—and that's what it's all about. Until methods of separation and reprocessing are perfected and end-use markets identified on the basis of the economics involved, incineration of random at-the-dump plastics waste for energy production offers the best solution.

Confusion over scrap. Recycling at-the-dump plastics waste and industry-generated scrap into usable end products that can be readily marketed for profit poses a strong challenge to the plastics industry. Reclaiming plastics at these levels requires development of new technology and, more significantly, a new understanding and attitude among industry members. SPI's estimate of 10-20 years for development of effective large-scale recycling of plastics waste and industry scrap seems lengthy to many in view of the super-technological era in which we live. But the plain fact of the matter is that, in addition to technological development, new attitudes toward scrap and waste plastic need to be cultivated among resin producers, designers and buyers of custom-molded products.

For many years, off-grade materials from the basic resin producer have found their way to processing machines via reprocessors, scrap brokers or by direct link to the processor himself. Similarly, scrap generated by the processor himself often is not reused and is sold off to other processors via brokers and reprocessors.

Needed: a standards program. Because there is no formal, reliable standards program for certification of the condition of scrap in certain transactions—such as from processor through broker to another processor—confusion often abounds and designers and specifiers of plastics lack confidence in the use of scrap. The lack of a program to certify that plastics scrap has a certain grade or suitability for specific types of applications has resulted in specification of 100 percent virgin materials in many instances when once-processed or off-grade material would do just as well.

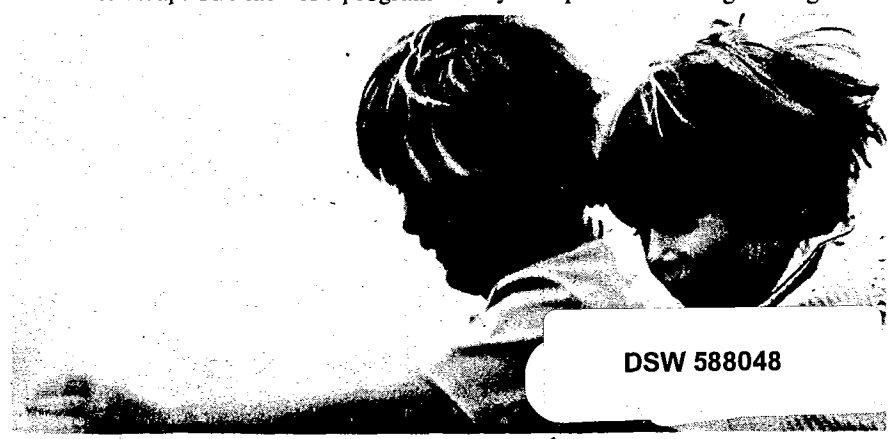
The recent polyethylene milk-bottle recycling program operated in San Diego by the Golden Arrow Dairy was stymied by a specification for 100 percent virgin material for agricultural drainage pipe. The dairy collected, ground and cleaned its own PE milk bottles and the regrind was then extruded into pipe—unfortunately, a local ordinance required that such pipe be produced from 100 percent virgin polyethylene.

Had there been a standards program in San Diego whereby the quality of the PE milk-bottle scrap could have been accurately assessed in light of specific applications, a ready market for the recycled milk bottles would have been at hand. The lack of a set of standards for scrap left those drawing up the ordinance no choice but to delineate virgin material for this application.

No standards—no ethics. Moreover, the lack of a scrap standards program has obviously had more of an effect than a few local ordinances specifying virgin materials. Throughout industry there are virgin specifications for low-priced resins that could easily be met by higher-priced scrap resins and even by scrap resin of the type designated.

Although nobody in the plastics industry talks about it openly, it is well known that scrap regularly finds its way into products calling for virgin ma-





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Ecological pressures have caused the plastics industry to look more closely at its scrap and inventory problems—we urge formation of a Plastics Recycling Institute within SPI.

terial. It is recognized that the once-processed resin will do the job and meet specifications just as well, but lack of standards force some molders to look the other way and throw in a certain percentage of scrap.

A reprocessor's view. Lawrence Sheftel, executive vice president, Reed Plastics Corp., Holden, Mass., a reprocessor of off-grade and scrap plastics, offers this cogent view, "Many years ago, the field of plastics reprocessing acquired a taint because practices were inadequate and products were inferior. That situation was corrected years ago, but mistrust continues and the industry is missing an opportunity to make scrap a more valuable commodity.

"Today," explains Sheftel, "when a part is conceived and engineered by a designer, he is apt to write into the specifications, the phrase, 'No regrind allowed.' or 'No reprocessed material allowed.' These banned materials very frequently do have properties adequate for the application, but they are categorically eliminated in favor of 'Virgin material only.'

"As a result, the fabricator must dispose of the scrap through dealers. If the scrap has economic value, there is a place for it in the chain of restoration previously noted. Unfortunately, there is not always a market for the scrap. Certain virgin thermoplastics are currently priced so low that colored scrap has almost no market value. Materials that often have such limited value are the olefins, the styrenes and the polyvinyl chlorides. Even a higher-priced engineering thermoplastic like ABS can become valueless as scrap unless OEM people revise their specifications to permit its reuse.

"In some cases, a government subsidy may be required to convert low-priced scrap to end products. In other cases, the major OEM companies would do well to review and revise their plastics parts specifications to allow the use of qualified scrap and reprocessed materials. The government already has started to lead the way. The GSA (Government Services Agency) has written a specification that requires that all paper the government purchases contain a maximum percentage of reclaimed waste paper. Similar action is potentially possible in the plastics field.

"OEM companies, injection molders, reprocessors and dealers can work together to make scrap a more useful commodity," Sheftel urges.

"Specifications can be written for use of scrap or reprocessed materials. The important factor is cooperation. Major polymer producers can help their customers use scrap and reprocessed materials and help them write the required new specifications. Reprocessors and dealers can help by supplying high-quality products. Working together, the whole plastic industry can do a better job of preventing scrap from becoming a pollutant at the dump or incinerator and, therefore, responsibly protect our environment."

Although the technology may not be fully developed for separation of aggregate plastics waste at the dump and for recycling at that point, energy generation via incineration is the appropriate immediate measure while the industry cleans up its scrap problem.

The confusion in the plastics scrap field must be resolved if recycling is ever to become a reality and it must start at the most basic level. The editors of Plastics World urge formation of a Plastics Recycling Institute within SPI as the first step. The prime responsibility of such an institute would be to draw up a program for certification and standardization of industry-guaranteed scrap (see "Let's Make Recycling Honest", the subject of this month's Last Word, p. 124.)

The Recycling Institute also should focus on another vital factor in the efficient use of virgin as well as scrap resin—the gap that exists between sales and production of resins, namely inventory. Here again, because there is no established program for monitoring and reporting resin inventory levels, prices fluctuate unpredictably and resin often is dumped on the market. The net result is a poor return on investment for resin producers as well as a depressed and uncertain market for scrap.

The situation demands that a certification-standardization program for scrap go hand in hand with a program for monitoring inventory levels of both virgin and scrap materials. With these two critical factors monitored and reported, the industry could begin to mount activities that would assure both efficient first use and recycling of resins. At the recently held SPI Western Division Conference, a custom molder commented on these two concepts in an interesting way, "The crisis that the plastics industry faces within the ecological movement will bring many of the industry ills requiring resolution to



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. . . We've been putting out fires instead of launching imaginative, resourceful programs that will demonstrate to environmentalists the quality and value of plastics.

the surface where they can be realistically handled." The industry's scrap problem is an obstacle to recycling that should be cleared up now.

Your help is needed. To date, the plastics industry has contributed $300,000 to SPI for research, education and legal activities involving plastics in environmental matters. Programs harking back to 1966, when SPI commissioned Battelle Memorial Institute, Cleveland, to put together a literature search of plastics' role in solid waste, have steadily grown stronger. In 1968, SPI established its Plastic Waste Management Committee, now comprised of some 270 members. Early last year, SPI formed its Committee on Environmental Policy, which sets policy on all environmental issues concerning plastics.

The $300,000 budget with which SPI has implemented these and other efforts is meager compared to the need. Certainly much of the misinformation that circulates so widely on plastics could be dispelled with additional funds and there are other effective programs that could be mounted. In addition to SPI effort, individual resin producers and processors have sought to counteract incorrect, incomplete statements about plastics as well as incorporating pollution-control devices and systems into their operations. Like companies in so many other industries, the level of investment by plastics companies in environmental control is rising.

But the reaction of SPI and the industry in general is not equal to the wave of criticism and ill will toward plastics that is now sweeping the country. For the most part, we've been putting out fires instead of launching imaginative, resourceful programs that not only will dispel rumor and ignorance, but that will demonstrate to environmentalists the quality and value of plastics.

Why haven't we done more? The reason is simple—no money and no manpower. Unfortunately, many firms not directly involved in plastics for packaging—where most of the problem for plastic lies—have not come forward or expressed interest in contributing talent or money. This is lamentable.

"It is vital that the plastics industry realize that not only packaging can be affected by legislation," says SPI in its booklet on solid waste management. "An attempt to restrict the use of plastics packages is an implied criticism of the entire industry. It makes all plastic products more vulnerable to other attacks on environmental issues. This is a problem for the entire industry, not just a segment of it."

The industry should get up off its apathy and do something positive and forceful.

(this report continues on p. 67)



DSW 588050

plastics life cycle

An especially designed fold-out chart covers plastics' role in ecology.

Plastics World has prepared an e
sive wall chart that traces the life
of plastics from their raw mat
sources, through their role in our
lives, to their demise as solid was
identifies problem areas and di
you to actions.

Additional copies are availab
$1.00 per copy for 1 to 9 copies.
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Write Plastics World Life Cycle Chart,
270 St. Paul St., Denver, Colo. 80206.

For additional information on the back-up advertisement by A. Schulman Inc.

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Schulman's world-wide operation consists of more than fourteen sales offices and plants in the United States, as well as facilities in Portsmouth, England; Bornem, Belgium; Paris, France; Cologne, Germany; and Milan, Italy. Whether your plant is located in Akron or Afghanistan, A. Schulman Inc. can serve you well with high quality, custom compounded plastics and rubber materials at competitive prices.

In addition to a basic dedication to quality . . . A. Schulman Inc. continues to grow because of a concern for corporate good citizenship . . . a respect for tradition . . . yet a willingness to change.



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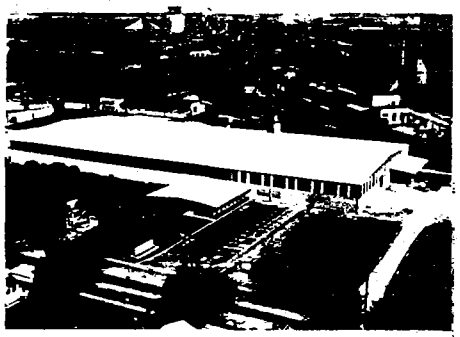

BELLEVUE, OHIO. Processing Plant. One of the most modern processing plants in the plastics industry. It provides 100,000 square feet, completely automated to produce all thermoplastics, specializing in polypropylene, ABS and PVC. Anticipating the future needs of the plastic industry, we are planning to build a complete "Tech-center" at Bellevue. Here we will help you design and engineer new compounds and alloys.

STRYKER, OHIO. Processing Plant. This modern 60,000 square feet plant has two banbury lines, and a modern quality-control lab. The plant is strategically located in Western Ohio, within easy shipping distances of Detroit, Chicago and other Midwest manufacturing centers.





ORANGE, TEXAS. Dispersion Plant. This completely automated dispersion plant combines the latest compounding equipment and technology . . . in keeping with A. Schulman Inc.'s constant striving for greater, more efficient production and higher quality. This plant is qualified to manufacture black polyethylene concentrates to Western Electric specifications, and makes excellent black concentrates for all thermoplastics.

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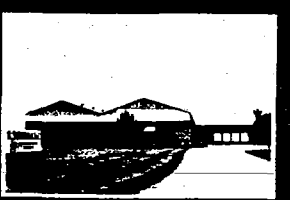

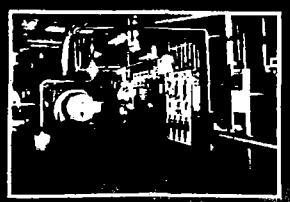

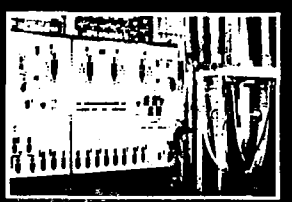





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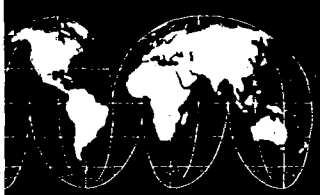
Plastic Products Begin Here

AKRON, OHIO. International Headquarters. (pictured left) Construction of the new International Headquarters of A. Schulman Inc. began this year. Over 60 officers and staff personnel will occupy this two-story building in late 1971.

The Akron complex also includes a large plastic compounding plant, a rubber processing plant and testing laboratory. Here polyethylene, polypropylene, ABS, PVC, and other special materials are compounded.





Akron Manufacturing Complex



Lab Technician operating laboratory extruder

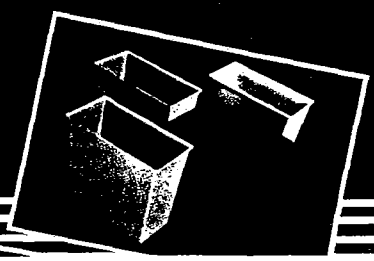




Research chemist shown at quality control panel



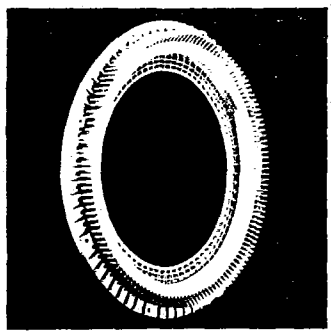
Film blowing testing machine



DORSET, OHIO. Plant. Other facilities in Ohio include this plant which produces custom-compounded hard rubber dust . . . used in applications from battery boxes to bowling balls, sheets and tubes.













A. Schulman Inc.
OVERSEAS OPERATIONS

Schulman's plant in Portsmouth, Hampshire, England (pictured left below), is equipped with extruders. This plant compounds plastics for the English market, as well as other European countries.

At Bornem, Belgium, A. Schulman Plastics S. A. (pictured right below) is equipped with the most modern production equipment and technical laboratory facilities to compound plastic materials for customers inside and outside the Common Market. This plant has three Banburies and six extruders.

Both of these overseas operations are being expanded to meet increasing demand for current products, and the innovations in European markets. There are sales offices at both locations, as well as Paris, France; Cologne, Germany; and Milan, Italy.





We Deliver





No shipping worries here! We've made delivery a science. Our fleet of hopper trucks and hopper-style railroad cars, plus our strategically located plants, make fast bulk shipping possible to almost any point in the United States. Appropriate materials are packaged in 1000-lb. cartons on non-returnable skids or 50-lb. bags to make shipping and storage even more convenient. If you want rapid service and quality plastic or rubber compounds, call on A. SCHULMAN INC. We deliver!

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plastics world

June 1971

PLASTICS & EC
LIFE CYCLE OF PLASTIC

HOW WE MAKE PLASTICS

WHERE PLASTICS COME FROM

Plastics are man-made materials in contrast to nature's materials like wood and metal. The first synthetic plastics in the United States were made in 1868, but they did not develop to significant volume until about 50 years ago. Plastics can be defined as any of a large and varied group of materials consisting of combinations of carbon, oxygen, hydrogen, nitrogen, and various organic and inorganic compounds. Technically speaking, plastics are "polymers"—as are synthetic rubber and man-made fibers.

Plastics are solid in the finished state, but at some stage in their manufacture they are in a liquid form that is capable of being molded into a desired shape, usually through the application of heat and pressure.

The basic raw materials used to prepare plastics are drawn from our reserve of natural resources. The largest volume of raw material for plastics involves either basic elements or naturally existing compounds such as petroleum or minerals.

From the raw oil that we take from the ground each year, only a small portion goes into chemical industry products. The remaining oil goes into the production of energy in engines and furnaces. Of the 5 percent going to the chemical industry only a portion is used as feedstock for manufacturing plastics.

BASIC RAW MATERIALS

PETROLEUM—In the process of refining raw oil to useful products it is possible to separate large quantities of organic molecules that are the basic raw materials for many different plastics. These materials include benzene, ethylene and propylene.

NATURAL GAS—This is another source of some of the organic structures used for manufacturing plastics. For example, natural gas is used to produce methanol, which in turn is used to manufacture formaldehyde, an important ingredient in several plastic materials.

AIR—Air can be combined with other materials to utilize either oxygen or nitrogen. For example, nitrogen from the atmosphere combines with hydrogen to form ammonia. In turn, ammonia goes directly into the synthesis of several monomers as well as being an intermediate used to produce nitric acid, an important ingredient in the synthesis of several plastics materials. Nitrogen is an important component of nylon, melamine and urea resins.

WATER—Used as a solvent or carrier in many stages of processing plastics materials.

MINERALS—Many minerals are important ingredients in plastics. These include salt used in manufacturing polyvinyl chloride; limestone used in manufacturing melamine; sulfuric acid, produced from sulfur, an important processing aid in many stages of plastics production. Also, many colorants, fillers and extenders are based directly on inorganic minerals.

OTHER BASIC MATERIALS include sand, wood, fiber and cotton.

INTERMEDIATE MATERIALS—Many chemical compounds used in producing plastics also are vital to the production of other products used by man. Some of the better known chemicals that are important in the production of plastics include: acetic acid, acetone, ammonia, castor oil, chlorine, formaldehyde, glycerine, methanol, nitric acid, phenol and urea.

MAJOR PLASTICS MATERIALS

Plastics materials range in density from material with a specific gravity as low as 0.89 to material with a specific gravity of 2.0 or higher. Plastics range in price from approximately $0.12 lb for some of the more common high-volume grades to several dollars per pound for special-performance materials.
The average cost is approximately $0.20 lb.

	VOLUME PRODUCED			
	1970		1980 (Estimated)	
	Millions of Lb	Percent of Total	Millions of Lb	Percent of Total
THERMOPLASTICS—These plastics become soft when exposed to heat and harden when cooled.				
POLYETHYLENE	5,900	32	12,000-18,000	30
Polyethylene was first introduced in the United States in 1942. It is familiar as the material for flexible icecube trays, tumblers, dishes, rigid and squeezable bottles, pipe and tubing, bags for candy and food products, rain capes, meteorological balloons, dry cleaners' bags, artificial flowers, greenhouses, silo covers, freezer bags, toys, moisture barriers under concrete and coated paper for freezer wrap.				
VINYL	3,750	20	7,200-11,000	18
The vinyls were made commercial in 1927 and now are produced in three forms: flexible, rigid and foam. Polyvinyl chloride (PVC) is the most important member of the vinyl plastics family. Vinyl resins are familiar as raincoats, garment bags, inflatable water toys, shower curtains, upholstery, draperies, garden hose, wire and cable insulation, phonograph records, blow molded containers, gaskets, weatherstripping, electric plugs, floor covering and coated materials.				
POLYSTYRENE AND STYRENE COPOLYMER RESINS	3,400	18	6,600-10,000	17
Polystyrene was developed in 1930. Copolymers of styrene have been developed for improved performance in certain applications. ABS is one of the more important copolymer resins that contains styrene combined with other monomers. Typical uses include kitchen items, food containers, toys, battery cases, instrument panels, wall tile, portable radio housings, drinking cups and furniture. Styrene copolymers and terpolymers offer greater toughness, higher impact properties and improved heat resistance.				
POLYPROPYLENE	1,040	5	3,200-4,800	8
Polypropylenes first were introduced in the United States in 1957. Typical uses of polypropylene include safety helmets, pipes and fittings, valves, packaging film, sterilizable bottles, wire and cable insulation, battery boxes, refrigerator parts, waste baskets, tubs for washing machines, flexible hinges, housewares and appliance parts.				
OTHER THERMOPLASTICS	1,260	7	5,000-7,800	13
Other important thermoplastics that are produced in lower volumes include: acrylic cellulosic, fluorocarbon, nylon, parylene, phenoxy, polyphenylene oxide, polyimide, polysulfone and polyurethane.				
THERMOSETTING PLASTICS				
The plastics materials belonging to this group are set to permanent shape when heat and pressure are applied to them during forming. Reheating will not soften these materials.				
PHENOLIC	1,040	5	1,600-2,400	4
Phenolics were introduced commercially in 1909. Typical uses for phenolic resins include automobile distributor heads, electrical switchgear, high-voltage insulators, appliance parts, tube bases, brake linings, coatings, handles, dials and knobs.				
POLYESTER	650	4	1,200-1,800	3
Polyesters were developed for commercial use in 1942. Typical uses of polyester resins include: impregnating cloth or mats of glass fibers, other fibers for use in reinforced-plastics boats, automobile bodies, pipe, luggage, aircraft components, interior partitions and skylights, appliance housings and furniture. They are used in cast form for marbleized counter and table surfaces, pearlescent buttons and furniture components.				
OTHER THERMOSETS	1,600	9	2,800-4,200	7
Other important thermoset resins produced in lower volumes include: alkyd, melamine, urea, epoxy and silicone.				
TOTAL THERMOPLASTIC AND THERMOSET RESINS	19,000	100	40,000-60,000	100

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OLOGY
S MATERIALS

HOW WE USE PLASTICS

Market	Percent of Total	Common Applications	Typical Life Span*
Building	24	Adhesives, coatings, flooring, foaming, glazing, insulation, pipe, plumbing, prefabricated bath components, protective coatings, rain gutters, siding, window frames.	10-40 years
Packaging	22	Blister packs, boxes, buckets, caps and closures, containers, cups, drums, flexible film, foamed containers, foamed pads, jars, rigid and semirigid bottles, shrink packaging, tubs, tubes.	less than 1 year
Electrical	10	Communication equipment, computers, circuit boards, electrical connectors, encapsulation, industrial electronics, insulators, lighting equipment, power equipment, wire coating.	5-30 years
Transportation	9	Automotive components (dashboards, trim, upholstery, body panels, lighting systems), aircraft, boats, campers, trucks, public transportation—buses, trains.	5-20 years
Housewares	6	Bathroom fixtures, decorative fixtures, kitchenware, storage containers, totes, wastebaskets.	3-15 years
Furniture	5	Cabinets, chairs, counter tops, decorative trim, tables, upholstery.	10-30 years
Appliances	3	Irons, personal-care products, refrigerator parts, washers.	5-15 years
Other	21	Agriculture, baggage, clothing, eyeglasses, industrial equipment, lenses, medical, recreation, shoes, signs, toys, traffic safety equipment, water treatment.	

*These life spans suggest the approximate range of times that plastics products might be expected to be used. It is not intended to imply that the products have failed or deteriorated at the end of the life span, but merely that they are taken out of service.

INDUSTRIAL POLLUTION

Industrial waste can be in the form of a gas, a liquid or a solid. Each form of waste can lead to air pollution, water pollution or land pollution, depending on the way it is disposed. Solid waste can create air pollution when it is improperly burned and water pollution when it contaminates rivers or ground water. Solid waste usually is associated with land pollution in the form of ruined landscape, disease and the removal of valuable land from constructive use. Solid industrial waste made up approximately 3.1 percent, or 150 million tons, of the 4.5 billion tons of all solid waste produced in the U.S. last year. It is estimated that American companies will be spending more than $18 billion during the next 5 years to clean up their processing operations to conform with legal standards as of the beginning of 1971.

The chemical processing industry and particularly the segment producing plastics materials is inherently cleaner than many industrial processing operations (e.g., production of metals, wood and paper products). This is because most of the raw materials used in making plastics are pure chemical compositions, that are combined with no substantial volume of solid by-products. Any by-products that are generated can be prevented from polluting the environment by the use of standard industrial pollution-control systems.

Likewise, plastics processing operations basically involve the heating and subsequent cooling of plastics materials. While hot, the plastics are molded, shaped and formed into finished products. In many cases, it is possible to recycle reject parts and scrap material within the original operation. Plastics processing plants have a low pollution potential when properly managed.

The strong moves to stop the pollution of our environment have increased the spending of plastics materials producers and plastics processors to improve an already fine record. And the industry has strongly supported moves to strengthen legislation relating to protecting our environment.

Many companies have established special environmental protection policies and activities to appraise the effect of their operations on the environment. These activities often include publications to inform the public about the steps they are taking to improve their community environments.

A self-analysis of pollution problems should be conducted by every producer or processor of plastics on a regular basis to identify existing or possible pollution problems. Early identification of such problems generally saves money that would be required to correct them at a later time. A booklet entitled "Self-Analysis of Pollution Problems" is available from the National Industrial Pollution Control Council (Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, price $0.30).

ACTION OPPORTUNITIES

Whether you are involved in the plastics industry, associated industries or, most important of all, a consumer of plastics products, you should take an active part in solving man's waste-management problems. When properly used, plastics materials can make many positive contributions to the improvement of our environment. Here are some of the ways you can participate in telling the story of how plastics fit into the improvement of our environment:

EDUCATE YOURSELF about plastics and ecology.

EDUCATE YOUR COMMUNITY about plastics and ecology.

CONTROL YOUR PLANT'S environmental effects.

INVESTIGATE YOUR PRODUCTS' environmental effects.

PARTICIPATE IN PLASTICS INDUSTRY ENVIRONMENTAL EFFORTS as well as those within your local community and those established on a national basis.

KEEP UP TO DATE on what's happening with plastics in ecological activities by contacting the following organizations and their environmental publications:

Environmental Protection Agency - Washington, D.C. 20460 - Publication: Environmental News (free)

Plastics World - 270 St. Paul St. - Denver, Colo. 80206 - Publication: Plastics & Ecology (Subscription: $12/year)

The Society of the Plastics Industry, Inc. - 250 Park Ave. - New York, N.Y. 10017 - Publication: Plastics and the Environment (free)

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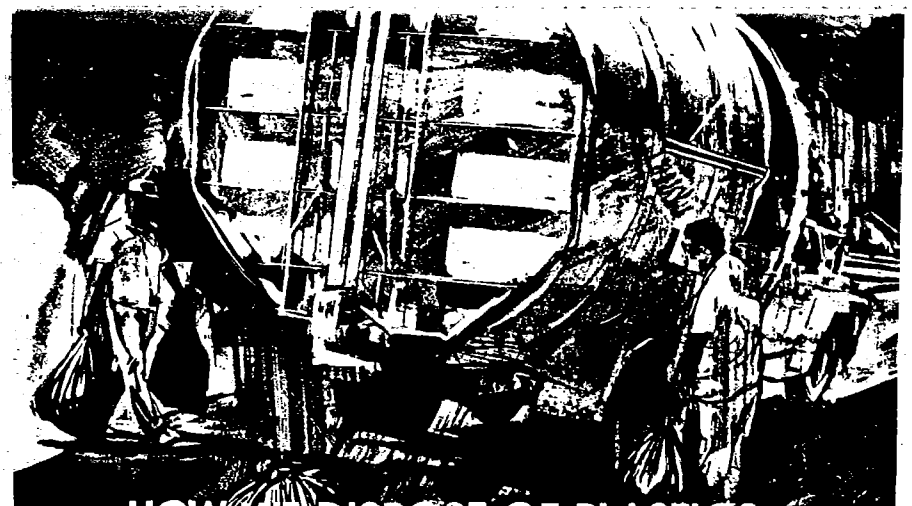

HOW WE DISPOSE OF PLASTICS

AN OVERVIEW—Disposing of the vast amount of solid waste generated in the U.S. has become a massive social and economic problem. The plastics industry is a relatively minor but highly visible part of that problem. The plastics industry recognizes that it has a responsibility to do its share to achieve effective solid-waste management practices and to work for a better environment.

Because of their utility in many applications, plastic products have made extraordinary contributions to the contemporary world. But as concern about environmental pollution has mounted, the plastics industry has become a target of uninformed criticism. Plastics have been called a litter menace. Both polyvinyl chloride (PVC) and polystyrene have been attacked erroneously as serious air pollutants and have come under threat of restrictive legislation. Most of this criticism has been inaccurate or grossly exaggerated.

To respond effectively to these developments, The Society of the Plastics Industry, Inc. (SPI) has undertaken two tasks: an effort to find solutions to solid-waste problems and a program of information and education on the role of plastics in solid waste.

In the area of research, SPI has commissioned a major study of plastics in incineration. It is believed that proper incineration is the most feasible method of solid-waste disposal now, and that it will be for the foreseeable future.

In the long term, if we are to conserve the country's resources and preserve our environment, we must learn how to reclaim the solid wastes we help to generate. This is not something that the plastics industry, or any industry, can do alone. The importance and complexity of the task require a national effort and heavy expenditure of both private and public funds.

It is not enough for the plastics industry to undertake research, to explore ways of reusing and recycling our products, to support the antilitter campaign of Keep America Beautiful, to work with government officials and other material-producing industries on solid-waste matters. The industry must inform the public about its activities. It must answer erroneous and potentially harmful criticism. It must deal with the difficult issues facing the industry candidly and comprehensively.

THE LITTER PROBLEM—Littering is a serious component of the solid-waste problem. Although the amount of litter and the costs required to dispose of it are difficult to measure, without doubt they are enormous. Litter presents a special difficulty for the plastics industry, since most litter consists of packaging, and carelessly discarded plastic packages catch the eye easily. Litter is an old practice and a national disgrace. What can be done about it?

The response of many states and municipalities has been to propose laws that would ban or heavily tax nonreturnable containers. The plastics industry believes that this will not go to the root of the litter problem, which is not packages but the persons who throw them away.

Litter is really a social problem and one that will have to be solved by social and educational means. The plastics industry advocates strong antilitter laws. Where it has been enforced, such legislation has been effective.

METHODS OF WASTE DISPOSAL — The standard current methods of solid-waste disposal are open dumping, sanitary landfill, composting and incineration.

OPEN DUMPING—*This is still the most widely used method of waste disposal.* According to the U.S. Public Health Service, more than three-fourths of all municipal refuse is discarded in dumps. But for present-day needs, dumping has insurmountable drawbacks. It is an eyesore, a health and fire hazard, and a waster of valuable land. Increasingly its use is being banned.

SANITARY LANDFILL—This method has a number of positive features. It is truly sanitary. If properly employed, it is economical, and it often results in the upgrading of submarginal land for recreational or commercial uses. Where land is available, landfill is an excellent solution to waste-disposal problems. Plastics make a suitable component of sanitary landfill. Since they do not decompose readily, they release no odors, gases or liquids that can pollute surrounding land, air or water.

COMPOSTING—Composts are pulverized organic wastes, chemically or biologically treated, that are used as soil conditioners and in landfill. The overriding disadvantage of composting for large-scale solid-waste disposal is that it has a very small market with limited growth prospects.

INCINERATION—Both because of its inherent advantages and the inadequacies of other disposal systems, incineration offers one of the most practical means of disposing of large amounts of all types of solid waste. Efficient incineration can bring about a volume reduction of up to 12 to 1. At least for the near-term future—say, 5 to 20 years—it is the logical solution to solid-waste disposal problems for large urban areas. Incineration has a bad name in the U.S. because most incinerators are obsolete and inefficient, providing poor reduction of refuse and polluting the air. There are only about 300 municipal incinerators in the country and 75 percent of them are inadequate by the Bureau of Solid Waste Management standards.

INCINERATOR TECHNOLOGY—Extensive research and development in incineration is under way in many countries. In Europe, *where rebuilding was required after* World War II and incinerator technology is more advanced than in the U.S., there are many modern plants that not only operate with little corrosion or pollution, but also serve as power generators. Plastics, which are petroleum derivatives and burn at high temperatures, make excellent fuels for these incinerators. Similar plants are being built in Canada and Japan. As the U.S. solid-waste load increases, it seems likely that power-generating incinerators eventually will be used widely here.

PVC IN INCINERATION—The properties of polyvinyl chloride in incineration have been seriously misunderstood. Contrary to much erroneous comment, hydrogen chloride (HCl) as a by-product of PVC is a negligible air pollutant and its effect in incinerator corrosion has been exaggerated. The overwhelming proportion of PVC is used in durable products designed for long service, such as wire insulation, floorcoverings and water pipes. PVC also has been said to produce phosgene gas. In fact, the amount of phosgene resulting from the burning of PVC is so minute as to be virtually nonexistent. Measuring techniques refined to 1/10 part per million do not identify phosgene when PVC is burned, according to studies at the University of Michigan.

POLYSTYRENE IN INCINERATION—Another plastic, polystyrene, also has been criticized as an air pollutant—primarily in its use in convenience packaging like meat trays and egg cartons—because it produces black smoke and soot when burned. Soot from burning polystyrene is carbon black in particulate form. While this is unpleasant, it is not toxic. In modern incinerators carbon black remains in the furnace and is consumed along with other particulates. Since most sizable U.S. communities now prohibit the open burning of refuse, carbon black from polystyrene generally is prevented from becoming an air pollutant.

BIODEGRADABILITY—Plastics are essentially nonbiodegradable—they do not decompose. The development of degradable plastics has frequently been proposed, primarily as a means of disposing of packaging materials. If such materials are introduced, marketing, distribution and consumption *will be affected by consideration of how long the packages will last.* While not to be dismissed, biodegradable plastics do not yet appear to be as promising as other solutions.

OTHER DISPOSAL TECHNOLOGY—Research and development is being conducted on other techniques of disposal. Some involves making landfills last longer. By shredding wastes before they go to a landfill, odor is reduced significantly and land is filled very evenly. Alternatives to incineration also are being investigated. One approach is the application of pyrolysis—i.e., the wastes are baked rather than burned. Pyrolysis can achieve a volume reduction of 94 percent. The technique can handle all types of solid wastes, and materials of value, such as iron and carbon, can be recovered from the residue. The majority of the baked residue is converted to gas, which is cleaned and scrubbed before release to the atmosphere. Pyrolysis disposal plants are being investigated by New York and Baltimore.

THE NEED FOR REUSE—*It is clear that we Americans cannot continue to dissipate our natural resources at accelerating rates.* Reclamation of our industrial wastes has become an ecological necessity. Ultimately, this will be a key factor in solving the solid-waste problem.

Up to now, it has been technically and economically impractical to reuse most materials, including plastics. But now it is apparent that substantial efforts must begin to develop this technology. The plastics industry also must seek to develop packaging sys that are returnable and use less material.

There are formidable technical barriers to true recycling of plastics, the reduction of them to their monomer or polymer constituents. But efficient reuse of reclaimed plastics for new purposes is a very real possibility. Research by both governmen and private industry has begun. Several methods show promise. Successful separation is the first step toward recycling. Othe companies are exploring the reuse of plastics as *filler for concrete, wallboard, paving and low-grade extruded pipe.*

* Certain portions of the material in this chart are taken from "The Plastics Industry and Solid Waste Management" a booklet published by The Society of the Plastics Industry Inc., New York, N.Y., 1970.

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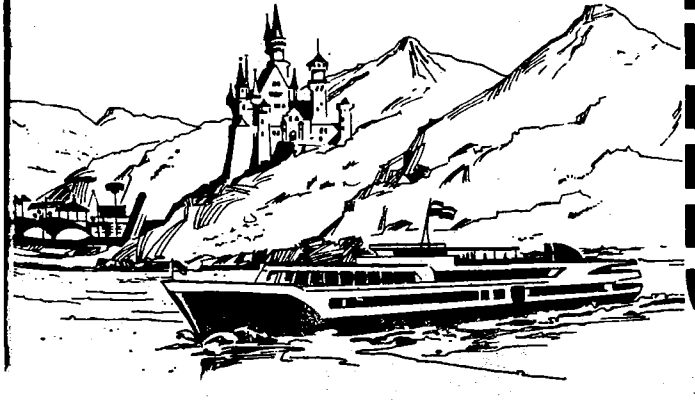

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hould be done—technologically?

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destroyed, diminished in size or taxed and legislated against until the problem is solved.

Plastics critics also demand that the plastics industry provide technological solutions to the problem it has created. This gives rise to a basic point concerning the development of technology



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to handle plastics in the solid-waste stream: the plastics industry can contribute only a portion of the technological solution for the proper disposal of plastics.

Ultimately, what is needed to handle the problems related to plastics in solid waste is a total system that efficiently and inexpensively collects and processes all solid-waste matter. Some of the refuse processed by such a system would be reclaimed and some of it incinerated, with energy output the aim.

Perspective needed. Development of solid-waste disposal technology within the plastics industry must be seen in this context or it will be misunderstood and misguided. Therefore, for environmentalists to blithely state that the plastics industry must shape up and provide the solutions to proper plastics disposal is a bit oversimplified. Key individuals and groups within the plastics industry must dovetail with government and private programs that aim at the total-system approach to solid-waste disposal.

The urgent need for coordination becomes quickly apparent when we observe the large number of groups working on the same type of techology. We immediately see a basic—and tragic—flaw. In the plastics industry alone, we see SPI working with NYU on an independently funded incineration study, we see a Manufacturing Chemists Assn. study by DeBell & Richardson covering some of the same ground. We see the Bureau of Mines working on HCl reclamation from PVC along with B. F. Goodrich, Monsanto, Union Carbide and others. Important work on polymer separation and recycling is being done by several companies.

The point is that considerable overlapping of technological development already has occurred, and there is no single, reliable source for collecting and distributing the data now being generated. Plastics World is not questioning that technology should be developed separately—there are competitive reasons why this is inevitable. Rather, we question that the technology should exist in a fragmented state and not be collected and disseminated according to known procedures.

NASA provides a clue. The situation is similar to the U.S. space effort in that many firms are engaged in the development of a similar type of technology and that the data generated have relevance across a broad spectrum of industries. NASA wisely set up a Technology Utilization program to gather input from contractors and then to distribute the technology throughout the industrial world.

The technique should be applied to the solid-waste problem—indeed, to the entire pollution-control effort—because it makes the generation of technology and the rate of developmental progress more swift and efficient.

But there is one factor in such a program that deserves additional scrutiny. NASA did a bang-up job of generating and collecting technological data, but did not do as well in communicating data because it lacked resources in communication systems and concepts. Should such a solid-waste technology-transfer program be adopted by a central source, special effort on the communication side of the transaction must be applied.

This brings up a basic point. If such technology-transfer program were e acted, to whom would the generatic of technology for plastics waste di posal be funneled? Or aluminum glass or paper, for that matter? Pla tics World assumed that the Enviro mental Protection Agency would the logical coordinator for such tec nological information and, accordingl queried officials at the EPA.

Frankly, the EPA would like to d this, but it does not see a full-blow technology-transfer program as fir in the order of priorities. EPA feels th it must first concentrate on establishi and enforcing standards. At the prese time, however, the EPA will acce letters and calls from individuals an companies requesting specific inform tion on solid waste. In turn, it will sen such information as it develops and available for distribution. But th agency basically does not see an activ technology-transfer program as pa of its primary function, nor is ampl funding now set aside for performanc of such a task.

Reinventing the wheel. In the opinio of Plastics World, this is shortsighte because right now the solid-waste dis posal wheel is being reinvented and re invented and reinvented. And the stor of its reinvention is being told and re told. This is costly, time-consumin and inefficient.

Operating in its own limited spher the SPI is generating technology an attempting to communicate it broadl to consumer groups, government o ficials and industry. The metals, glas and paper associations are doing th





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same. The result is a scattered mass of information full of redundancies and incongruities—and a total lack of organized communication procedures to filter and funnel the technology to the appropriate audiences.

Fortunately, this story does not have a completely unhappy ending. There is hope and it is expressed in the formation, nearly a year ago, of the National Center for Solid Waste Disposal, Inc. A nonprofit organization, the Center was established by the steel, aluminum, glass, metal can, paper, plastic, soft drink, brewing, supermarket and chain store, food-canning and food-processing industries. Its aim is to mobilize and coordinate industrial efforts, in close cooperation with federal and other private efforts to achieve long-range solutions to the national problems of solid-waste disposal and litter control.

In its fact sheet, the Center states: "The Center was formed as a result of the recognition by industry that the many efforts being made to deal with the problem of solid-waste management were overlapping, incomplete and uncoordinated. There was an obvious need for a center of excellence in the handling of existing knowledge and search for new capabilities."

Interestingly enough, the Center's recently appointed president is Dr. Richard L. Lesher, a former assistant administrator of NASA who was responsible for management information systems, the scientific and technical information programs and the Technology Utilization program.

NASA's methods will help. In discussion with Dr. Lesher about his plans for the Center, the former NASA executive told Plastics World that the techniques used by the space agency to generate and transfer technology would be applied. Plastics World not only applauds the organizations that have supported formation of this Center, but sees in its operation great potential for problem solving and for acceleration of the solid-waste R&D effort. Hopefully, as much effort will be applied by the Center to communicating solid-waste technology to the proper audiences as to compiling the data.

Because technology is proliferating in the solid-waste field, perhaps EPA will reorder its priorities to include a formalized technology-transfer program. Hopefully, its program would include increased emphasis on communicating findings, rather than just storing them as information for inquirers.

While the National Center for Solid Waste Disposal certainly is apt to be more flexible and fast-moving than EPA, in the long term EPA should be the authoritative voice in solid-waste information. Plastics World urges members of the plastics industry to tune into both of the previously mentioned organizations and, particularly, to stress to EPA the need for its role as a technology-transfer mechanism.

Plastics-disposal technology. The fact that technology developing for plastics waste disposal alone would more than fill the many pages allotted in Plastics World for this report points up the need for a central information clearing house for all solid-waste technology. Although plastics-disposal technology is formidable in quantity, there are several key developments worth noting.

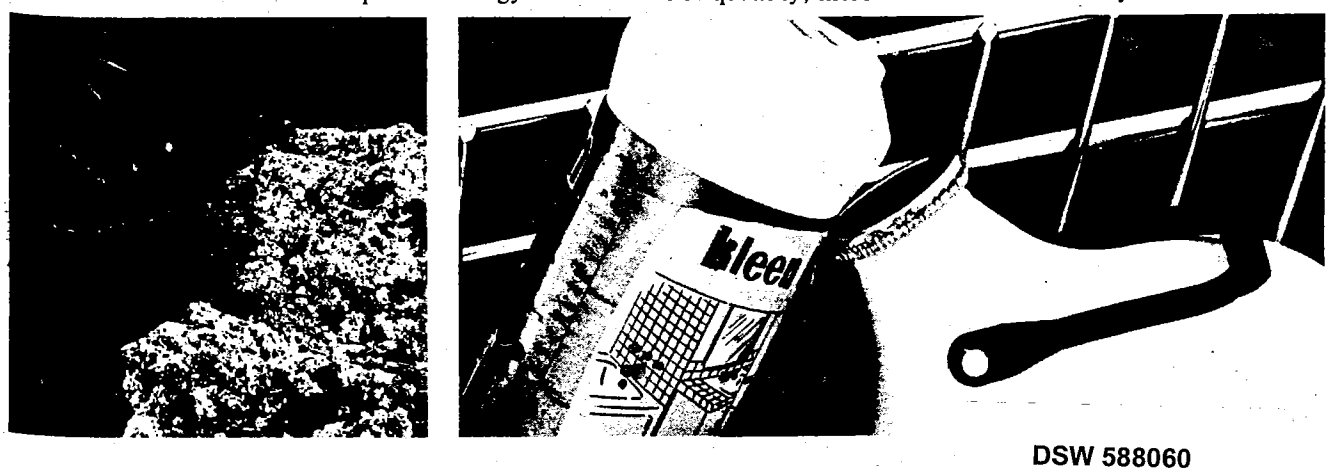
Because it represents the most immediate solution to plastics disposal, effective, modern incineration has been given the biggest push by SPI and is the object of development by a number of companies inside and outside the plastics industry.

Dovetailing with the overall solid-waste research effort now going on in all industry, SPI has sponsored incinerator research at New York University. The aim of this $90,000 study—which will be completed in June—is to pinpoint the effects of plastics in incineration and to provide recommendations on incinerator design and operation with plastics in mind.

With 75 percent of the nation's municipal incinerators inadequate by Bureau of Solid Waste Management standards, it is understandable that large-scale development is under way in this field.

Incineration advances. One of the most noteworthy developments in incineration is the recent installation of a modern, well-designed unit in Chicago that will burn 1600 tons/day of municipal refuse. Reportedly, it will burn all wastes, including plastics, without polluting the atmosphere. Furthermore, the unit produces more than 110,000 lb/hour of steam. Electrostatic precipitators remove particles and flyash while the unit provides 95-percent incineration of all matter.

It is estimated that plastics comprise from 2 to 3 percent of Chicago's municipal refuse (this is about average for most cities), which are readily processed in the facility's continuous-feed



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mechanism. The Chicago incinerator features reverse-reciprocating grates that prevent fouling and assure effective combustion. Chicago officials expect that the large unit will cost only $4.50/ton to operate after approximately $3/hour is realized from the sale of steam. Similar incinerators are slated for other cities, including New York and Montreal. If the nation's key cities were equipped with enough units of this type to process all solid waste, environmentalists no doubt would be silent about plastics.

Much has been occurring in the area of industrial incineration, too. An interesting example of a new development is the recent arrangement established by Spaulding Fibre Co., Tonawanda, N.Y., industrial laminate producer, and Combustion Equipment Assoc., Inc., designers and manufacturers of pollution-control systems. According to Combustion Equipment president, Robert Beningson, Spaulding has signed a 15-year, $15-million contract with his company to design, build and operate an on-premise pollution-control system that burns solid and chemical wastes to generate the plant's energy. A processor of thermoset materials that can't be reused, Spaulding will net the high Btu output of these materials and replace an obsolete coal-fired steam plant in the process. Projections indicate that the unit will pay for itself in energy output and should wastes from other plants be taken in, Spaulding could realize a gain.

A similar on-site incineration unit was installed early this year by Whittaker Corp.'s Narmco Materials Div. in southern California. A producer of epoxy and polyester prepregs, the company generates noxious vapors and chemicals that now are incinerated to produce power for air conditioning and cooling.

New units can take plastics. Industrial incineration is developing rapidly, and it is reasonable to say that anything the plastics industry can dish out in waste form can be safely burned in modern, well-designed units. At least this is the conviction of Jack Savidge, president of Energex, Ltd., a San Diego producer of incineration systems for industry. Utilizing a suspension-burning technique that he calls a "Cyclo-Burner", Savidge's unit blows shredded waste into a high-temperature, low-abrasion, refractory-lined burner.

Ignition of waste is achieved by radiant heat from the refractory-brick lining of the tube. Initial heating is accomplished with auxiliary fuel, but once the unit is up to temperature—1200F—it is self-sustaining.

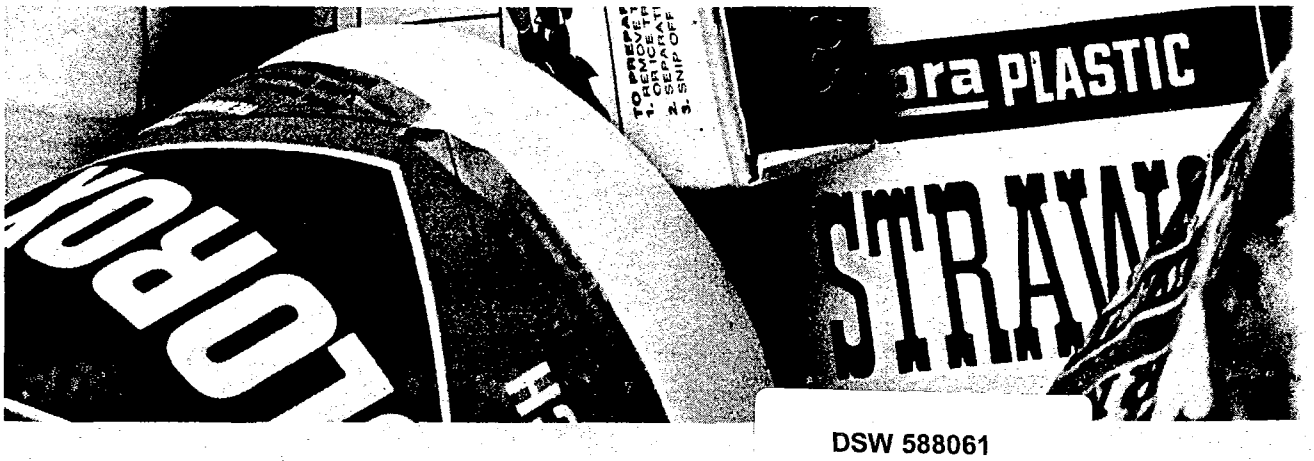
In preliminary runs, the unit processed approximately 600 lb of polyethylene/hour, emitting smokeless gas at temperatures in excess of 2200F. Savidge claims that PVC should present no problem, with scrubbers affixed to catch HCl runoff.

Plastics reclamation. Much also has been developing in technology for reclamation of plastics materials. Chief among the methods in this area is pyrolysis—burning waste in the absence of air or oxygen—which yields usable raw materials. Monsanto Chemical Co. has experimented with pyrolysis for recovering crude monomers from plastic containers.

B. F. Goodrich also has been exploring pyrolytic reclamation of HCl fr PVC waste. It is estimated that I constitutes 55 percent of PVC. though this work reportedly has duced positive results at the compar Avon Lake laboratories, it is not kn whether the procedures would re successfully to a commercial operat The Bureau of Mines also has sugg ed that PVC scrap be salvaged fo HCl content. The Bureau indic that production of HCl from PVC be economically favorable.

Because the Bureau of Mines c sidered municipal refuse as a sourc PVC, it has concurrently explo separation methods to isolate PVC other polymers from random plas waste culled from general refuse. separation technique used by the reau of Mines is a sink-float meth which divides five types of plas —HDPE, LDPE, PP, PS and P Water provides an initial division of mixture and then alcohol and wa solutions give further separation.

Separating polymers. Cumberla Engineering Co.'s Waste Doctors D also has come up with effective me ods of separating plastics and clai the ability to divide polymers w specific gravities as close as ±2 lb/ ft. Waste Doctors calls its mechani technique vacuum-gravity separati and affirms that it will easily separ PVC from PP. The company's meth also will separate mixtures of three more polymers provided that th specific gravities differ by as much ±3 percent. Therefore, a mixture rigid PVC (sp gr 1.4), polystyrene gr 1.06) and HDPE (sp gr 0.95) co be divided easily. It should be rec nized, however, that modifiers such



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pigments, fillers, extenders and stabilizers alter the specific gravities of materials and could result in some confusion in the separation process no matter which technique is used.

Utilizing mechanical separation techniques again, Waste Doctors has produced a system for salvaging materials from wire and cable scrap. With size-reduction equipment and a vacuum-gravity separator, Waste Doctors shreds and separates insulation from conductor. Although the separation is used primarily to recover copper and aluminum conductors (more than 50 percent of copper used today is reclaimed), if effective means of recycling the plastics insulators were available, it could be turned to profitable application.

Recycling scrap. Actually, a recent machinery development by Werner & Pfleiderer holds promise for recycling scrap (see "Don't Throw Away Your Scrap—Make Something out of It", Plastics World, March 1971, p. 63). The company's under-$15,000 "Remaker" is a low-pressure, intrusion-molding machine that reportedly will mold 100 percent scrap. Using aluminum tooling, it will turn out thick-walled plastic parts. Shoe soles, bicycle seats, cable connectors, luggage handles, lawn-mower wheels—all have been molded from scrap. In fact, scrap PVC insulation recovered from wire was molded into functional lawn-mower wheels on this machine. Werner & Pfleiderer management points out that it has successfully molded aggregate plastics waste (a mixture of ABS, PS, PVC, PE, PP) with a chlorinated polyethylene binder from Dow Chemical. Dow and other companies have demonstrated successfully that CPE can be used to bind random waste for use as a suitable molding material. In its lab experiments, Dow blended chlorinated polyethylene with various types of plastics scrap. CPE was mixed with a blend of LDPE, HDPE, PS, PVC, ABS, PP and also mixed with each type individually. The company's conclusion, reached after extensive testing, was that CPE can be added to recovered waste plastics and reprocessed into a thermoplastic alloy with useful physical properties.

Elsewhere on the materials scene, a water-soluble polymer ("Klucel") from Hercules has packaging disposability implications.

Hydroxypropyl cellulose is the chemical term for "Klucel" and Hercules describes it as combining "solubility in water and polar organic solvents with thermoplasticity. In addition, it is cleared by the U.S. Food and Drug Administration as an intentional food additive. Therefore, it can be said that 'Klucel' is a soluble, edible, thermoplastic and disposable polymer."

Hercules explains further that its material is processable on plastics machinery and reports promising applications in such areas as blown packaging film, blow-molded bottles and injection-molded, dissolvable pharmaceutical capsules.

Similarly, the development of photodegradable polymers for plastics packaging that will deteriorate upon exposure to UV rays offers promise (see "Photodestructive Plastics Promise Solution to Waste Problems", Plastics World, March 1971, p. 12). The UV-sensitive polymers were developed by Gerald Scott, professor of chemistry at the University of Aston, Birmingham, England. The material disintegrates from solid form at varying rates depending upon its required lifetime and processing method used. Scott estimates that it will be 2-3 years before a commercial product is available. Potential applications include disposable tableware, plastic coverings and plant pots.

Hand in hand with the development of specialized materials suited to ecological needs has come a proposal to rate the disposability of packages. Presented by David J. Freiman, manager—packaging, consumer products division, Corning Glass Works, the concept is called D-factor analysis. Every parameter related to a package's ecological impact is evaluated by formula and a rating established. Such a rating system will require standardization of parameters to be evaluated as well as agreement on these and the research needed to perform the evaluation.

The preceding developments represent the key happenings in plastics-disposal and recycling technology, but they are among many, many other developments that have direct bearing on effective handling of plastics solid waste—indeed, all solid waste.

As important as the development of technology, however, is the implementation of a comprehensive communications program for the solid-waste field. Without this, technological development will be erratic, overlapping and inefficient, and, frankly, the plastics industry will be the scapegoat of environmentalists all the longer.



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CIRCLE 31

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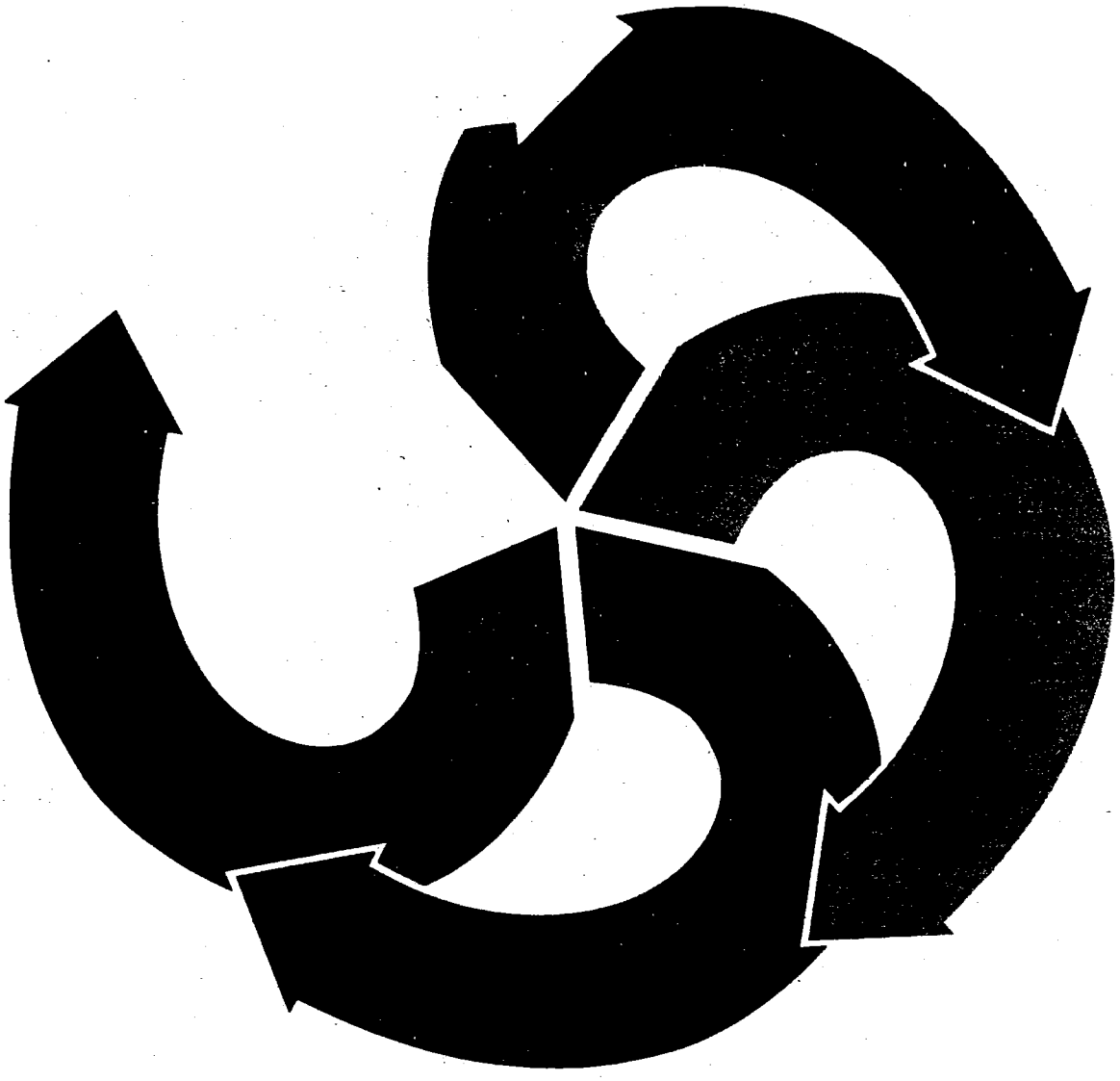

dusenbery is creativity

Matching our creative engineering and production talents to the needs of an industry, the John Dusenbery Company has consistently kept pace with the challenges of the modern converter.

Back in 1950, when E. I. Dupont needed equipment to slit and wind light, stretchy Mylar*, we created the machine to do the job. **In 1954,** when polyethylene films needed special winding techniques, we created core adaptors and individual lay-on rolls for this new thin, stretchy material. **In 1956** when the converting of fragile sheets of reconstituted tobacco baffled the industry, Dusenbery created the equipment to slit and rewind it. **In 1960** Dusenbery created the first individual rewind arm slitter-rewinder to handle off-caliper materials and produce rolls of uniform density with precisely controlled tension. **In 1969** when the magnetic tape industry sent out a call for sophisticated machinery to slit and rewind cassette and other magnetic tapes, Dusenbery created its 809 series with highly specialized innovations to improve production rates and keep pace with a changing technology.

This year alone, Dusenbery has introduced three new materials handling devices and turret type unwinds and rewinds to speed production, cut down-time and increase profitability.

Through two decades of industry growth and new technology, Dusenbery has led the way in anticipating the needs and creating the equipment to keep pace with converting progress. Write to us on your letterhead. **Tell us your requirements, we may already have created a solution for your slitting and/or laminating problems.**

*DuPont Reg. T.M.

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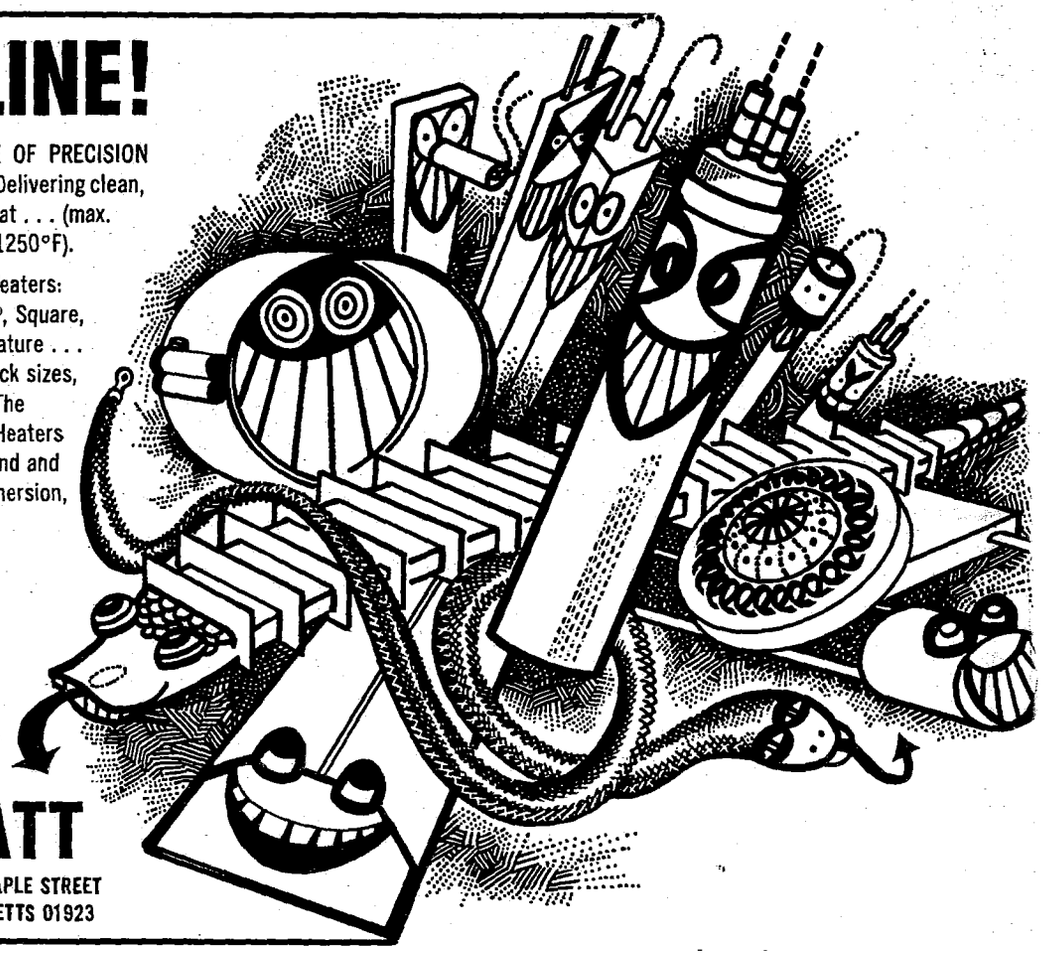

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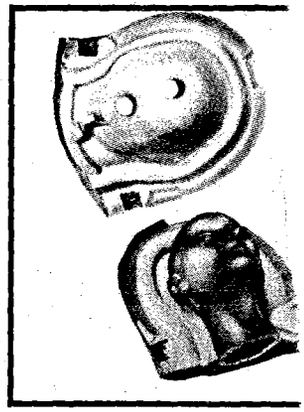

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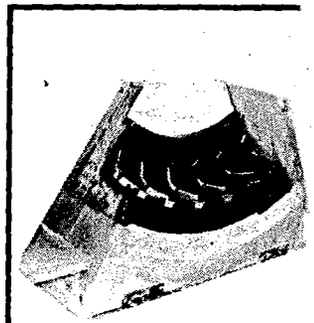
On your company letterhead, describe the part to be made, and the casting material you plan to use. Our technical staff will select a job-proven formulation and send you a generous FREE trial sample. Or, call us and we will be happy to discuss specific problems with you and make recommendations.



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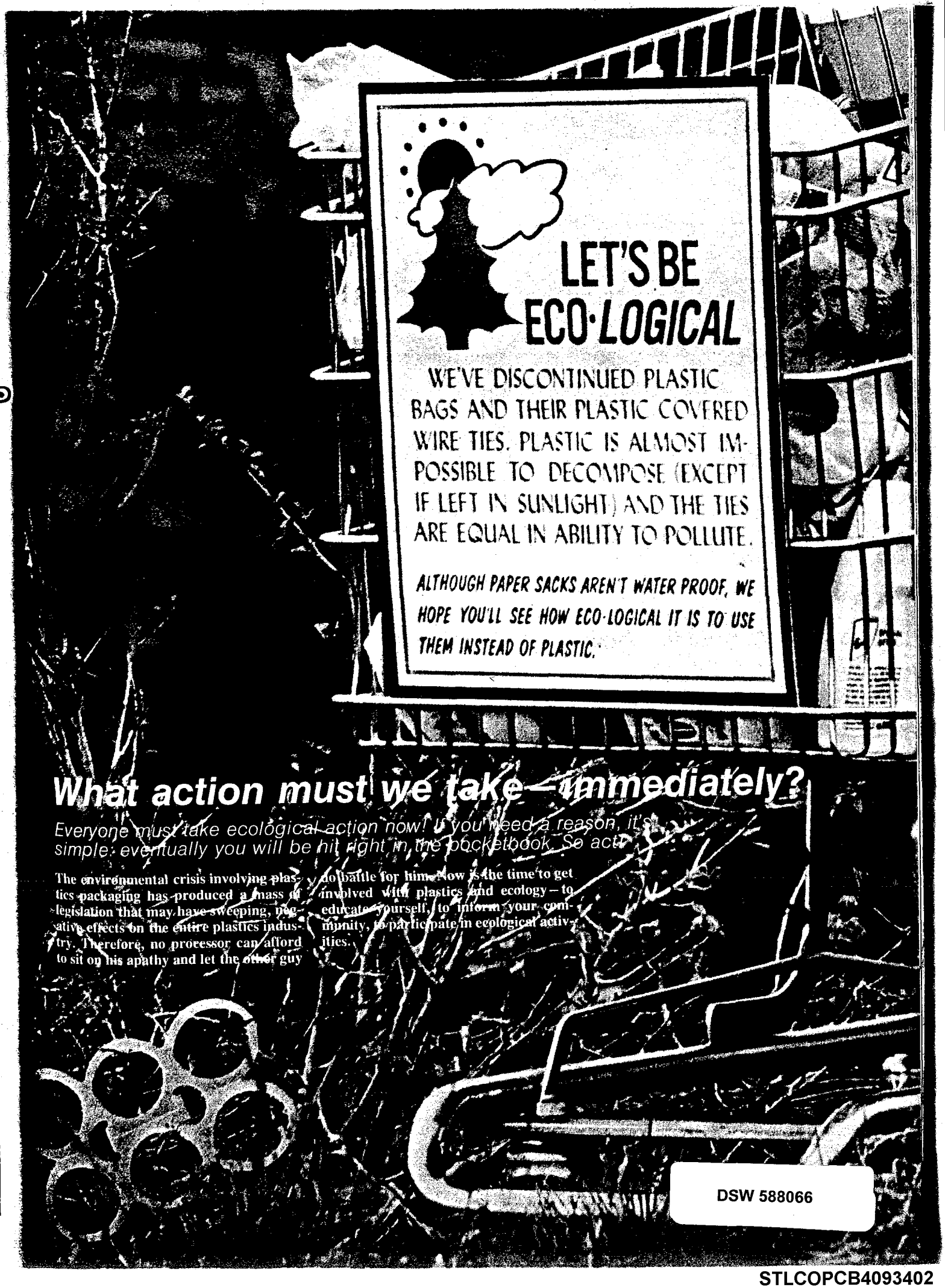

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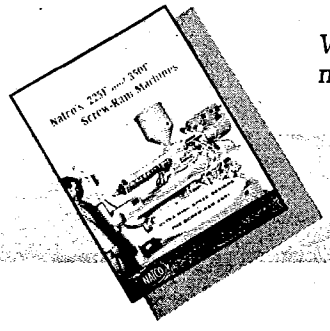
Dependability...

plus speed makes the Natco 350 a winner!



Built in both 20 and 40 ounce capacities, Natco 350E fully automatic machines are known throughout the plastics industry as real money makers! Independent hydraulic circuits for mold clamp and injection actions, with precision controls, result in smooth "shockless" operation. Natco's famous "closed circuit" hydraulic systems eliminate big operating valves. High speed, hydraulic drive, screw rotation provides greater plasticizing rates.

Natco's full hydraulic clamp is fast and inc porates slow downs where needed. Hydrau ejectors, core pulls, booster pump for higher jection speed and solid state control are availa as options. Many desirable features, standard Natco machines, are optional extra charge items competitive equipment. Investigate the true depe ability of these Natco Models 350E20 and 350I and what it will do for you.



Write for Bulletin #2008A describing Natco's 350E machines as well as a smaller size 225E.

NATIONAL AUTOMATIC TOOL COMPANY, INC.

RICHMOND, INDIANA 47374 U.S.A.

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CIRCLE 35

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The fact is that you cannot remove yourself from the circle of fire lit around the plastics industry by the environmentalists. You are involved—like it or not!

As SPI has stated, not only is it a matter of ethics that impels plastics processors to take action in the area of ecology, it also is a matter of economics. Even if you are a pipe extruder, a toy molder or an FRP boat maker and feel that you are far removed from the environmental crisis involving plastics packaging, don't think for a moment that you can afford to be unconcerned.

The fact is you cannot remove yourself from the circle of fire lit around the plastics industry by the environmentalists. Indeed, even if you are only minimally involved in plastics, there is legislation pending that will affect the total sphere of the industry—including you.

In fact, this legislation is the very big, very specific reason for every processor to take action. Because, like it or not, even though the present legislation probably will not pass, the repercussions surrounding its birth and death will ring through the consumer world. And these waves will hit you right in the pocketbook—in terms of loss of jobs, of shrinkage of market and of restraints that may hinder your use and sale of plastics products.

For example, just imagine what would happen if PVC for packaging were banned or severely taxed in New York. Such a regulation would affect PVC producers, processors, packagers—even designers of packages. It would have implications right down the line from the president of the resin company to the food manufacturer who packages with PVC. It even would affect those trying to market new products in plastics.

Therefore, heed the call to action and realize that when the SPI says, "The entire industry must become involved," that means you.

Fortunately, there are many ways you, as a processor—whether you are an extruder, an instrument maker or a food packager—can act immediately. Just follow this action plan:

1. Educate yourself about plastics and ecology.
2. Inform your community about plastics and ecology.
3. Investigate your plant's environmental effects.
4. Investigate your products' environmental effects.
5. Participate in community environmental efforts.
6. Participate in industry environmental efforts.
7. Participate in government's environmental efforts.
8. Anticipate future environmental needs.

In this section Plastics World provides information that will help you to implement this action plan. Included are:

Action Steps, p. 77, a discussion of specific ways you can carry out the plan.

Action Databank, p. 79, a description of primary sources that can provide further information and help.

Action Options, p. 81, a summary of the additional items available from Plastics World relating to plastics and ecology.

Action Literature, p. 82, a listing of some pertinent publications.

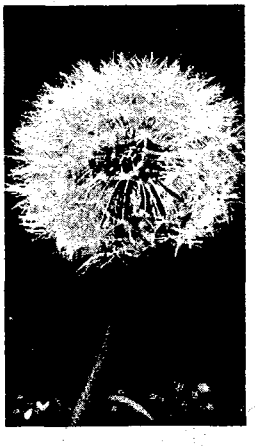
In addition, because there are so many other organizations, publications and companies and so much other information relevant to plastics and ecology, Plastics World has compiled and offers to readers a separate Action Packet. This packet expands on the information covered in this section and encompasses much more. For example, it outlines more than 50 action steps and provides complete details about more than 65 information sources. (See p. 81 for more details.)

Now go to it—get involved in plastics and ecology—educate, communicate, participate!

Action Steps

Plastics World has listed below a few of the many, many things you can do to promote better understanding about plastics and ecology and to improve our environment. Undoubtedly you will come up with many more—and when you do, please let us know. Then we'll spread the word to other processors via Plastics World's new updating service, a monthly newsletter called "Plastics & Ecology". In the meantime, here are some actions to consider. (Also consider the fact that other industries, such as the glass and paper industries, are far ahead of us with environmental action plans. ***Educate yourself about plastics and ecology*** and about the overall environmental problem. Efficient ways to do this include:







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- Use this report, SPI literature and other factual sources to get the real lowdown about plastics and ecology. These will prevent you from getting caught in a misleading statement simply because you are ill-informed.
- Learn the laws relating to plastics products and plastics processing so you do not break them inadvertently.
- Make this self-education program an on-going one. Keep current on what's happening through "Plastics & Ecology", and through trade, environmental, industrial and governmental publications and organizations. (See the Action Databank for a brief listing of these.)

Inform your community about plastics and ecology. Communicate, don't complain about consumer and media misinformation. You can "persuade your neighbor" in several ways:

- Speak out with an objective and practical view. Help to dispel the emotion that too often dominates discussion on the environment. Remind your community of plastics' benefits.
- Get to know your local media and environmental groups and keep them informed of the real facts.
- Promote tours of your facility for local environmental groups and students.
- Donate publications such as SPI's "The Plastics Industry and Solid Waste Management" or this report, which is available as a reprint, to local conservation groups and libraries.
- Display "Plastics – Part of the Solution – Not Pollution" emblems. (For more information, see p. 81.)
- Sponsor consumer-industry panels and forums to initiate two-way communication. For example, Plastics World is sponsoring, with the cooperation of SPI and Good Housekeeping, a panel discussion on plastics and ecology between industry spokesmen and consumer magazines.

Investigate your plant's environmental effects. Do not allow your processing to pollute your community. Ways to prevent this include:

- Plan your plant location as environmentally as possible.
- Check out your air, water, solid-waste and noise pollution carefully.
- Make environmental planning part of your corporate planning.
- Search for business opportunities to help to solve environmental problems.

Investigate your products' environmental effects. To prevent your products from getting a bad environmental name, be sure to:

- Concentrate on ease of disposal or recycling in the early stages of product or package design.
- Promote the reuse of your product.
- Spell out plainly in your advertising the durability or the disposability status of your product.

Participate in community environmental efforts. To support local activities:

- Join and participate in community efforts such as those sponsored by the Chamber of Commerce and conservation groups.
- Offer your expertise (business and technical) to local environmental groups.

Participate in industry environmental efforts. Be sure to work with ot processors in these ways:

- Support SPI in its efforts to gat and to disseminate the facts ab solid-waste problems and progress.
- Organize your SPE chapter i a task force that tackles local envir mental problems, specifically those volving plastics waste. Consider ting up a reclamation program.
- Sponsor or cosponsor resea on disposal, reuse and recycling.
- Join SPI's speakers' bureau act as a listening post in your area. S provides slides and information.
- Support the formation of a Pl tics Recycling Institute.

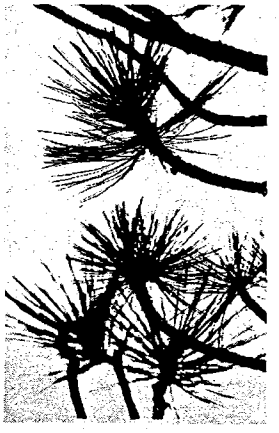
Participate in government's environmental efforts. Work for your co munity in these ways:

- Learn what state legislators doing in the area of environment. Jo the debate and discussion before la are passed.
- Back legislators in their efforts speed up governmental research disposal and recycling.
- Work with governmental age cies, both local and federal, to sol solid-waste disposal problems.

Anticipate future environmental needs. Plan not only for today but als for years to come:

- Make sure you are aware of th many technological developments con ing along that relate to the disposabilit of plastics.
- Look ahead to the day when po lution-control regulations will be seve and consider such possibilities as a in-plant heat-recovery incinerator.







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Educate yourself about plastics and ecology so that you can inform others and so that you can take ecological action in your community and in your industry.

Action Databank

To educate yourself and your community, consider these information sources—publications and organizations that can provide further information and help. These are the primary sources that you cannot afford to overlook in your educational program. (A more comprehensive list of more than 65 information sources is included in the Action Packet, see p. 81.)

Organizations

Government Agencies

Environmental Protection Agency
Office of Public Affairs
Washington, D. C. 20460
(202) 632-7692
Consolidates pollution-control functions previously housed in five separate federal agencies. Establishes and enforces standards.

National Industrial Pollution
Control Council
Washington, D. C. 20230
(202) 967-4513
Composed of industry executives, this council seeks to identify pollution problems and to speed solutions.

Council on Environmental Quality
Washington, D. C. 20230
(202) 382-1415
Assists the President in preparing an annual environmental quality report and makes recommendations.

Industry Groups

Disposal Group
Society of the Plastics Industry, Inc.
250 Park Ave.
New York, N.Y. 10017
(212) 687-2675
Provides information and advice on the disposal of plastics materials; suggests cooperating members for extensive consultation; promotes environmental education programs; publishes "Plastics and the Environment" newsletter and position papers; provides material for speakers' bureau.

National Center for Solid
Waste Disposal, Inc.
1625 I St. N.W.
Washington, D. C. 20006
(202) 296-2664
Aims to coordinate the solid-waste activities of industry, labor, government and consumers.

Consumer Group

Keep America Beautiful, Inc.
99 Park Ave.
New York, N.Y. 10016
(212) 682-4546
Acts as clearinghouse for litter-prevention techniques, methods and materials information.

Consulting and Service Groups

DeBell & Richardson, Inc.
Hazardville Station
Enfield, Conn. 06082
(203) 749-8371
Consults the plastics industry; conducts research relating to plastics and ecology.

Arthur D. Little, Inc.
Environmental Systems Group
Acorn Park, Room 32/102
Cambridge, Mass. 02140
(617) 864-5770
Conducts research aimed to solve client problems in the field of environmental management.

International Systems Design, Inc.
2175 Lemoine Ave.
Fort Lee, N. J. 07024
(201) 947-4113
Performs computerized literature searchs on pollution control.

Publications

The Plastics Industry and Solid
Waste Management
Society of the Plastics Industry
250 Park Ave.
New York, N.Y. 10017
1 copy free; 3 or more, $0.50 each
Gives position statement of SPI; overviews the subject of plastics and ecology; outlines SPI activities; suggests individual actions.

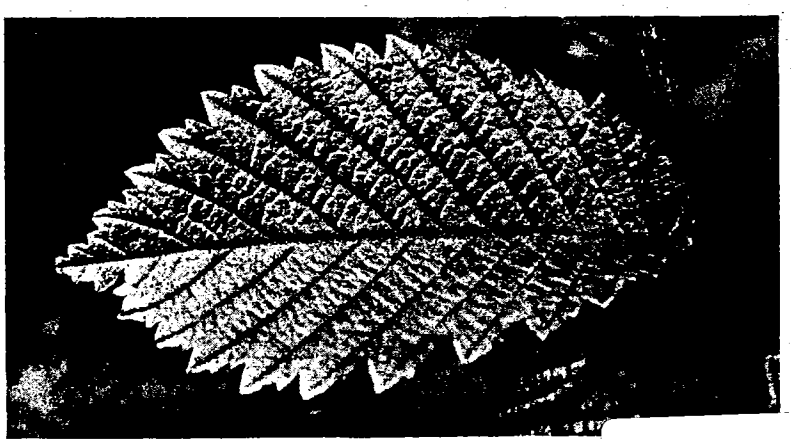
The Role of Packaging in Solid Waste
Management—1966-1976
Superintendent of Documents
U.S. Government Printing Office
Washington, D. C. 20404
$2.25
Discusses outlook for packaging, disposability of packaging materials and mechanisms for mitigating problems caused by packaging materials in waste disposal.

Self-Analysis of Pollution Problems
Superintendent of Documents
U.S. Government Printing Office
Washington, D. C. 20404
$0.30
Sets forth self-analysis technique in the form of a questionnaire.

Solid Waste Management of Plastics
(prepared by DeBell & Richardson, Inc.)
Manufacturing Chemists Assn.
1825 Connecticut Ave. N.W.
Washington, D. C. 20009
$10
Analyzes and references pertinent literature on plastics waste disposal and brings together an up-to-date worldwide review.

Third Pollution: The National Problem
of Solid Waste Disposal
(by William E. Small)
Praeger Publishers
111 Fourth Ave.
New York, N.Y. 10003
$6.95
Reviews problems; outlines progress; describes present state of public opinion.







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CIRCLE 36

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Action Options

The items listed below will help you to take action in the area of plastics and ecology. For example:

You can order more copies of this special feature (starting on p. 41) and of the chart (p. 49) to disseminate to locate schools, environmental groups and media.

You can order an Action Packet that includes: a fact sheet about plastics to help you to dispel misinformation; a discussion of ecological benefits provided by plastics; a compilation of additional information sources; an outline of more action steps; and a listing of other pertinent literature offered by plastics companies.

You can subscribe to a "Plastics & Ecology" updating service, a monthly newsletter published by Plastics World that will keep you current on pertinent happenings in the public, industrial, technical and governmental sectors and how they relate to you.

You can order emblems that promote "Plastics—A Solution —Not Pollution". These adhesive-backed, pressure-sensitive stickers, designed by Plastics World's art staff, are being manufactured by Tyco/Coating Products, Inc. (See opposite page for a sample.)

To get any or all of this material, just complete the coupon, clip it out, make your check payable to Plastics World and mail.

Ecology Editor
Plastics World
270 St. Paul St.
Denver, Colo. 80206

Please send me the items I have indicated. (All prices listed include postage and handling.)

PLASTICS & ECOLOGY		Quantity Desired	Dollar Amount
Special Feature	$1 each (1-9 copies) $0.75 each (10-99 copies)	____	____
Chart	0.50 each (100 copies or more)	____	____
Action Packet	$3 each	____	____
Newsletter	$12/year	____	____
Emblems	$10/100 $50/1000	____	____

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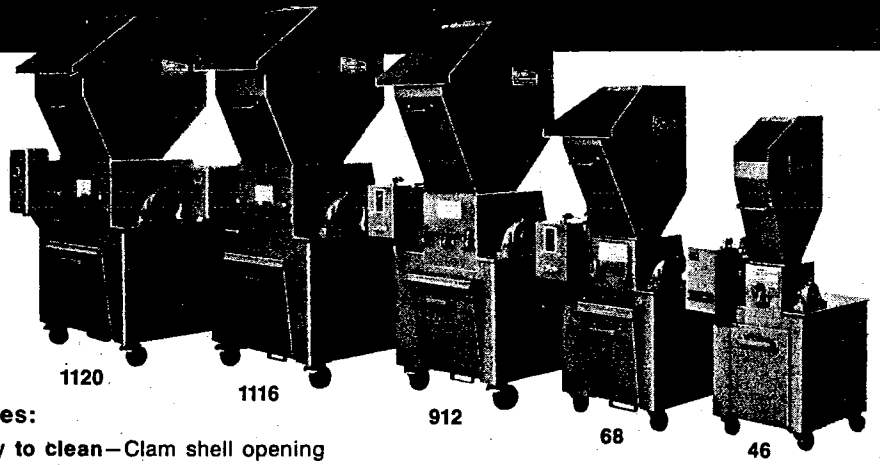

Check these unique engineering features:

Hooked rotor design mounts knives at special angle giving scissors-action cut with bed knife. Thicker sections are cut cleaner at lower horsepower and less fines.

Hopper offset to front of cutting chamber so that feed stock is drawn in rather than bounced back. No fly-back. Faster reduction, higher throughput.

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CIRCLE 37

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Action Literature

These items represent some of the literature available that relates to plastics and ecology. Other literature will be covered in the Action Packet described on p. 81.

PS foam containers. The basic facts about foam cups and containers and accurate data on their ecological effects are spelled out in this almanac, produced for SPI's Foam Cup Div. Lando, Inc., Public Relations Div., 725 Liberty Ave., Pittsburgh, Pa. 15222. **368**

Automated refuse collection. This item discusses the AVAC pneumatic trash transport system. Developed in Sweden, this system reduces operating costs by eliminating manual handling and the need and costs of vehicles, corridors and tunnels. It also improves building hygiene and transfers large quantities of trash in short periods. Envirogenics Co., 9200 E. Flair Dr., El Monte, Cal. 91734. **369**

Scrap reclaim. The "Vertruder", one answer to reclamation and compounding needs, is described in this leaflet. The heavy-duty machine reclaims granulated and sheet plastic scrap. Included are specifications that detail this low-cost, vertical-barrel system. Gloucester Engineering Co., Inc., 18 Sargent St., Gloucester, Mass. 01930. **370**

Meeting environmental needs. How one chemical company organizes to meet these responsibilities is the subject of this booklet, which covers manufacturing operations, product responsibility, R&D and social considerations. B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland, Ohio 44115. **371**

Pyrolysis process. One solution to the solid-waste disposal problem—pyrolysis—is described in this publication, which details the "Landgard" system. Such pyrolysis systems are of particular ecological interest because of their cleanliness, ability to handle all types of solid wastes, practical economics and opportunities of resource recovery and recycling. Monsanto Enviro-Chem Systems, Inc., 800 N. Lindbergh Blvd., St. Louis, Mo. 63166. **372**

Waste-treatment systems. The "Purifax" process discussed in this brochure quickly converts waste into light, inert, odorfree sludge by wet oxidation. Easy and economical to install, the process is simple to operate and is applicable to any type of domestic sewage treatment plant. BIF Purifax, Inc., 345 Harris Ave., Providence, R.I. 02901. **373**

Uses of 'Fiberglas' tanks are delineated in this guide that explains how FRP tanks help to prevent pollution and possible catastrophe. Included is a checklist that helps to define the corrosion potential of any particular site. Owens-Corning Fiberglas Corp., Non-Corrosive Products Div., Fiberglas Tower, Toledo, Ohio 43601. **374**

Antipollution program. One company's commitment to ecology is outlined in this booklet "Monsanto and the Environment". It details a five-point program undertaken to insure that any internal pollution problems are under proper control. Monsanto Co., 800 N. Lindbergh Blvd., St. Louis, Mo. 63166. **375**

Pollution-control services. Answers to pollution problems are discussed in this brochure that details the services offered by these specialists. Services include waste treatment, collection, evaluation and separation. Rollins-Purle, Inc., 3208 Concord Pike, Wilmington, Del. 19803. **376**

Waste-management systems. The full services offered by this company in the area of liquid and solid-waste management are spelled out in this literature. The range of services includes feasibility studies, conceptual design, process engineering, construction and start-up assistance. Environmental Control Systems, The Dow Chemical Co., 2020 Dow Center, Midland, Mich. 48640. **377**

Bottles and ecology. This booklet, "Polyethylene Milk Bottles in Today's Ecology", explains why the single-trip PE bottle is the best package for milk and reviews all methods of packaging. Uniloy Div., Hoover Ball & Bearing Co., 135 E. Bennett St., Saline, Mich. 48176. **378**

Packages and ecology. With emphasi on "Plastic Packages and the Environ ment", this bulletin summarizes exten sive scientific and technical literature o solid-waste disposal. B. F. Goodrici Chemical Co., Public Information Dept 3135 Euclid Ave., Cleveland, Ohio 44115 **37**

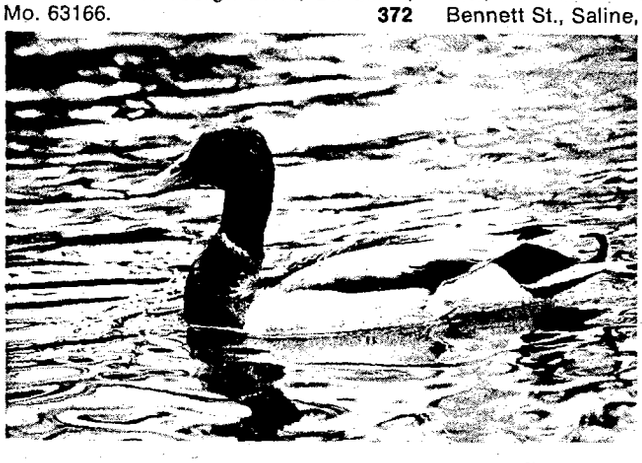
Systems approach to solid-waste disposal. "A Pledge & a Promise . . .", a very comprehensive overview of the waste problem, is the title of this useful publication. It starts with a definition of waste, then provides statistics, on amounts and kinds, information on collection, processing and disposal, and concludes with a review of problems and solutions. Anheuser-Busch, Inc., Ecology Dept., 721 Pestalozzi St., St. Louis, Mo. 63118. **380**

FRP for pollution-control equipment. This bulletin points out how more and more designers are using FRP for pollution-control roles. Atlas Chemical Industries, Inc., Wilmington, Del. 19899. **381**

Pollution-free incineration. "The Road Back" is the title of this bulletin that discusses one method of solid-waste disposal—incineration. Given are details about the system, which provides high-volume burning, high reduction and low operating cost. Kelley Co., 6720 N. Teutonia Ave., Milwaukee, Wis. 53209. **382**

'Disposing of Disposables.' A very useful reference guide, this booklet can be used to educate consumers and distributors about accepted methods of effectively disposing of one-time-use plastic foodservice products. Sweetheart Plastics, Inc., 30 Inner Belt Rd., Somerville, Mass. 02143. **383**

Plastic packaging guidelines. This series of publications puts into perspective the pollution question regarding PVC. Zeroing in on pollution—fact or fiction—the leaflets examine all parts of the question. Diamond Shamrock Chemical Co., 300 Union Commerce Bldg., Cleveland, Ohio 44115. **384**





STLCOPCB4093409

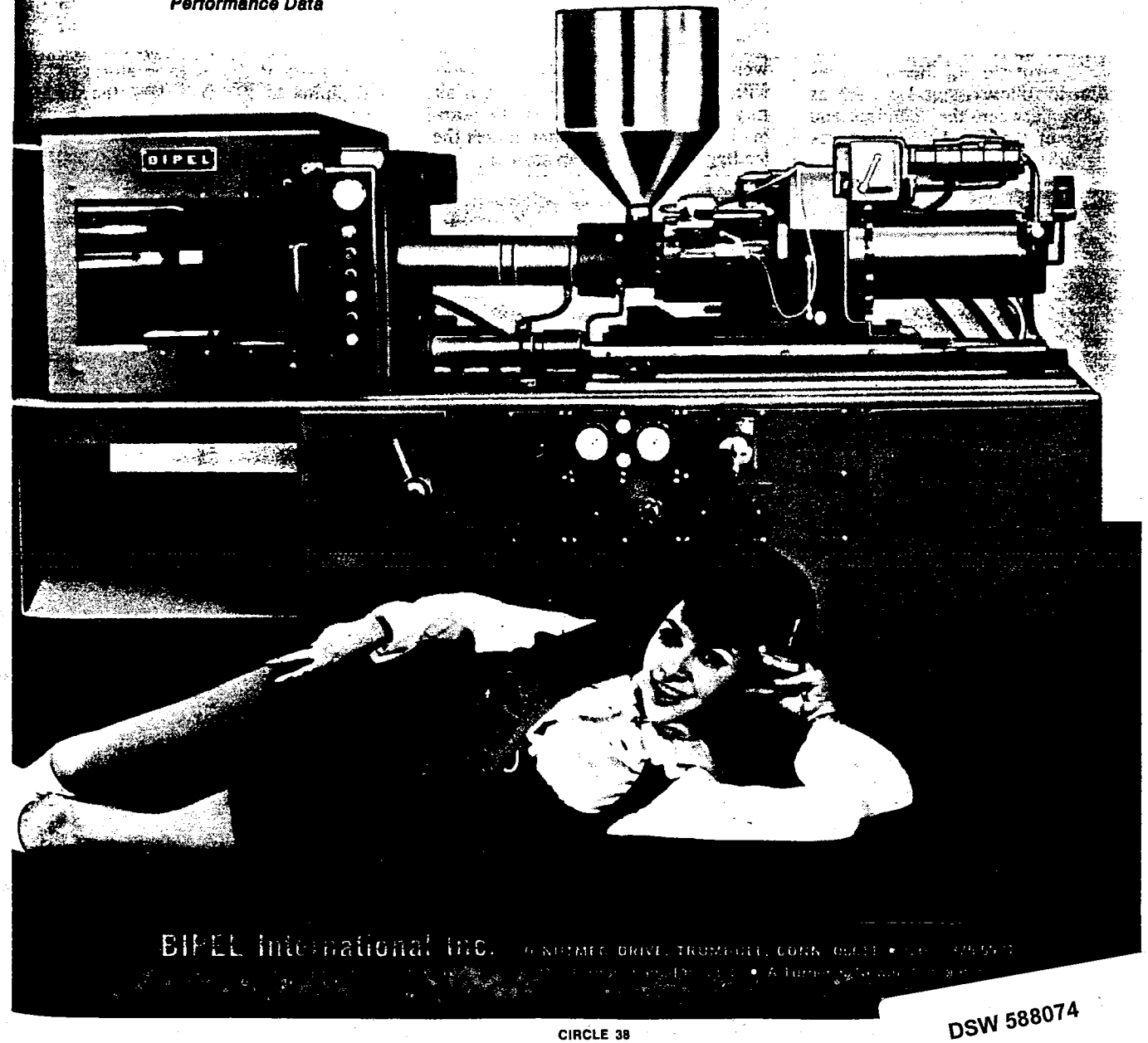
Bipel's clear, uncluttered designs are delightfully free of excess wiring, piping, projections and attachments. Adjustments and controls are ideally located. Set-ups and changeovers are fast, easy, and economical. Look to Bipel for the functional designs of tomorrow . . . in Bipel's Thermoplastic or Thermoset Injection (5 models from 42 oz. to 1.3 oz.) . . . Compression/Transfer Presses (manual-semi-fully automatic from 25 to 660 tons) . . . and Preformers (4 models 13 to 155 tons, with the new electrically controlled sequencing).

Join the move to BIPEL

Clean Lines, Flexible Operation, and So Easy to Handle!

INJECTION PRESSES

Write for Detailed Specifications and Performance Data



BIPEL International Inc.

DSW 588074

CIRCLE 38

STLCOPCB4093410

Rotating, bottom-fed die produces multilayer blown film

Blown-film coextrusion with a new twist was demonstrated by Egan Machinery at the National Packaging Exposition, May 3-6. (For a show report, see this issue, p. 12.) The total package extruded, blew, sealed, serrated and wound dual-layer film in a continuous process, all automatically controlled by computer.

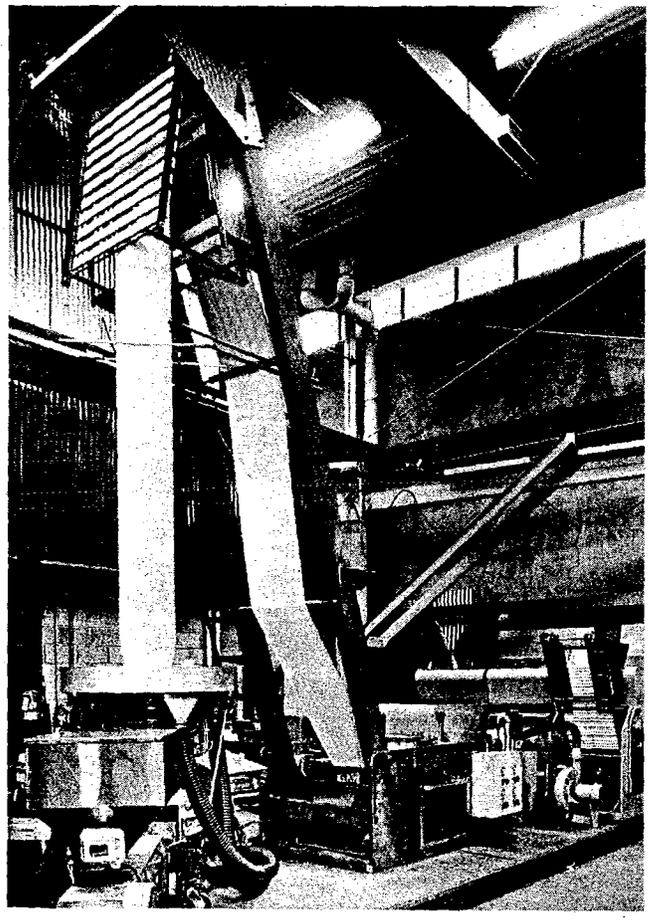
Starring in the processing line was Egan's recently developed bottom-fed spiral mandrel die that rotates as the resin is fed through it. This 8-inch-dia die handles up to three layers of material. The rotation of the die allows the film to follow a spiral pattern as it passes between the mandrel and the body of the die. This distributes any slight thickness variations throughout the width of the wound roll, so that built-up irregularities and film-stretching are held to a minimum. Gage variations are held to ±5 percent.

The process-control computer software was developed by Egan by using a Digital Equipment Model PDP-L computer to handle extrusion, web processing and winding. Such functions as speed, temperature, gage, profile and web tension are monitored and charted.

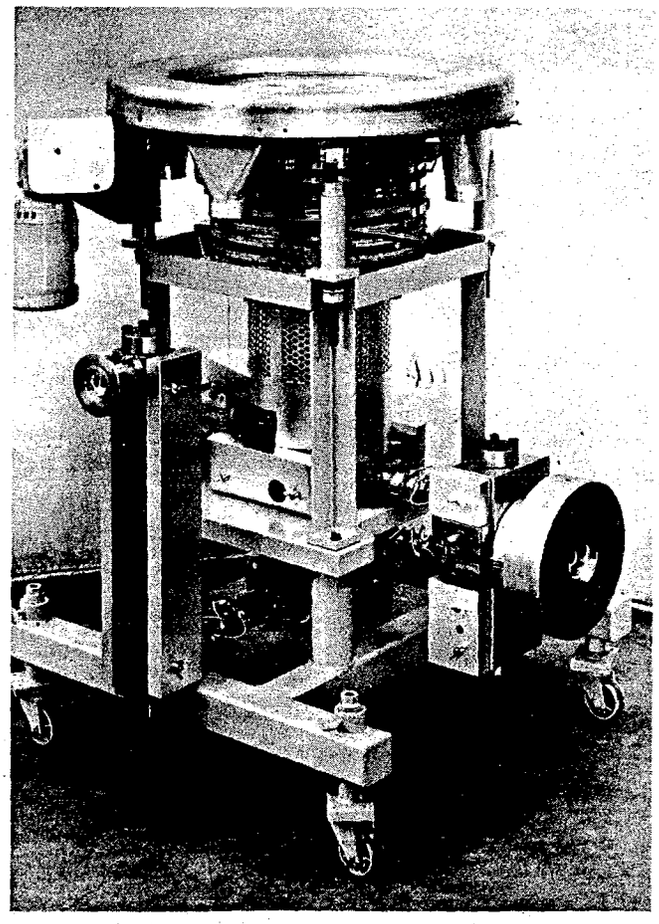
Other components of the exhibit were two 1-1/2-inch-screw extruders with 24:1 ratio, a cast-aluminum air ring, a sealer-serrator and the automatic "Mini-Winder" that guides the leading edge of the web around a new core without glue or tape.

There are many other possibilities that Egan can offer to manufacturers of blown film. Up to three extruders can be used with the die, with various screw sizes. Materials successfully processed include low-density polyethylene, high-density polyethylene, polypropylene, plasticized vinyl, nylon, "Surlyn" and polyesters.

Egan offers any part of the processing line as an individual unit, or it can put together machinery meeting special demands. Cost of the coextrusion die is $20,000. With rotator, cart and piping to the extruders, the die runs $40,000. Egan Machinery Co., S. Adamsville Rd., Somerville, N. J. 08876. **220**



Multilayer blown film is processed by using special bottom-fed rotating die. Sealer-serrator and automatic winder (at right of photo) process the film into bags.



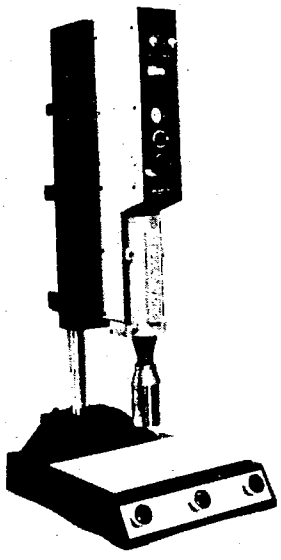
Eight-inch tubular film die with rotator and cart is designed for coextrusion of up to three layers. It is shown here with piping for two extruders.

DSW 588075

STLCOPCB4093411

Ultrasonic welder offers single-unit construction

The 400 Series welders for plastics integrate power supply and stand in one unit to conserve work space, ease setup and simplify operation. Air and electricity are supplied directly to the unit through the only two external connections. Converters snap in and out through an access door and a counterbalanced elevator control allows height adjustment of the head. Trigger pressures range from less than 10 to more than 200 lb. Model 430 delivers 2900-in-lb/sec mechanical power (350w) and Model 460 has 5900 in-lb/sec (700w). Branson Sonic Power Co., Eagle Rd., Danbury, Conn. 06810. **221**



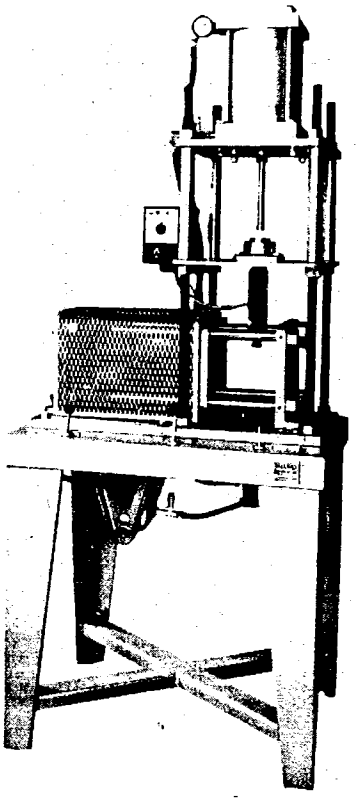
Twin-screw extruder stars in R&D lab

A 1-inch twin-screw laboratory extruder, Model ZDS-K28, duplicates the major processing features of production-type machines. Interchangeable screw sections have separate components consisting of several different screw profiles as well as various-shaped kneading discs. Designed for maximum flexibility, the machine's range includes basic polymer research, polymerization, reactions and compounding, as well as strand extrusion for pelletizing, color matching and sampling. The processor may tailor the setup for nearly any specific material or processing application. The unit has a 10:1 variable-speed drive. Auxiliary equipment includes a cooling manifold, die head and control cabinet. Werner & Pfleiderer Corp., 160 Hopper Ave., Waldwick, N. J. 07463. **222**

Plunger operation reduces molding cost in lab machines

Two laboratory or short-run injection-molding machines operate manually in molding any thermoplastic. Instead of an expensive hydraulic-screw plasticator, a plunger operated by air compressor enables the manufacturer to sell the unit for around $3000 to keep the cost of sampling and prototype work down.

With capacities of 1 oz and 1-2/3 oz, these two models, PM-20 and PM-225, offer many features usually found only in hydraulic units. PM-20, a tabletop model, features a manual eject lever that opens the mold and knocks out the finished part. Model PM-225, shown in photo, has automatic part ejection. Hillard Industries, Inc., 1222 New Market Ave., South Plainfield, N. J. 07080. **223**

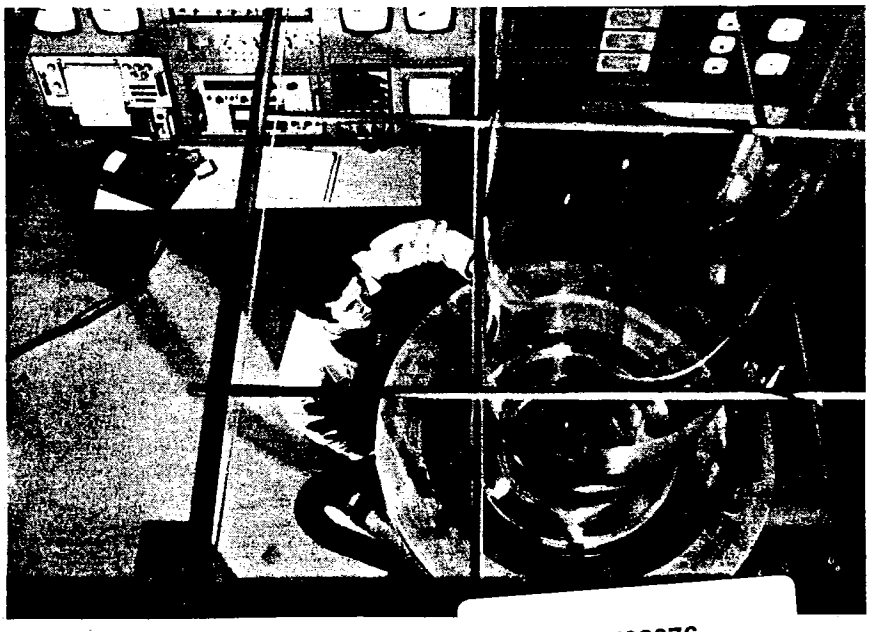


Specifications of Hillard Injection-Molding Machines

	PM–20	PM–225
Shot capacity, oz	1	1-2/3
Injection pressure, psi	17,000	24,000
Plasticating capacity, lb/hour	7	12
Clamping stroke, tons	5	25
Maximum mold size, inches	5 by 5	8½ by 5

Computer analysis helps film die control gage

An extruder die for blown film produced to a design created by computer analysis reduces film thickness variation to close tolerances. The computer technique applies the melt-flow properties of the polymer to determine the design of die that will produce a uniform flow distribution for a given type of plastic. The use of such an accurate die provides substantial savings in material costs, since film can be extruded at minimum thickness, instead of the 5 or 10 percent over minimum required for processing by less critical gage control. The Power-Gas Corp., Ltd., Box 21, Stockton-on-Tees, Teesside, TS18 3Ha, England.

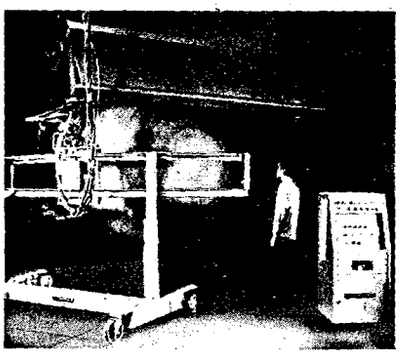


DSW 588076

STLCOPCB4093412

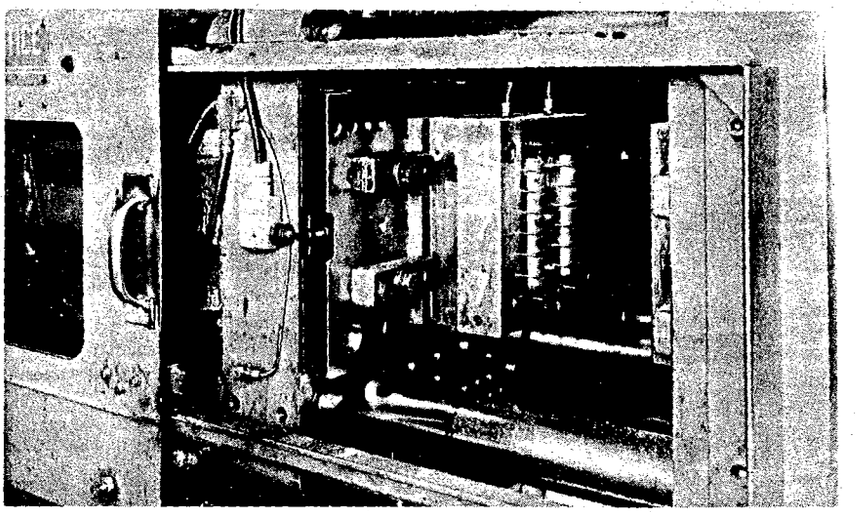
Programmed tape automates spray-up

A fully automated machine for spray-up of chopped fiber glass and resin has a programmed tape that starts, stops and controls travel speed of the carriage. It also directs the chopper and spray gun through any predetermined cycle, shuts off and purges the gun automatically and returns it to the starting point for the next piece. Wall thickness can be made uniform from edge to center or varied to exact specifications. Each part produced is identical to the one before. McClean-Anderson, Inc., 120 W. Melvina St., Milwaukee, Wis. 53212. **224**



Mold protector rescues molds from damage

Plastic injection-mold protector comes complete with an electronic control box, flashing light, pressure pad, friction reed and two miniature sensing switches. The reed is attached to the platen and the plate. Between the two pads is a gap that is supported by a single side of the platen and mold. Any malfunction or hang-up of material that would damage the mold s faces triggers the miniature switch They reverse the closing action of t machine and alert the operator of malfunction. The system activat on a very small percentage of t clamping force. R&A Plastics, In Higgins Industrial Park, Worceste Mass. 01606. **22**

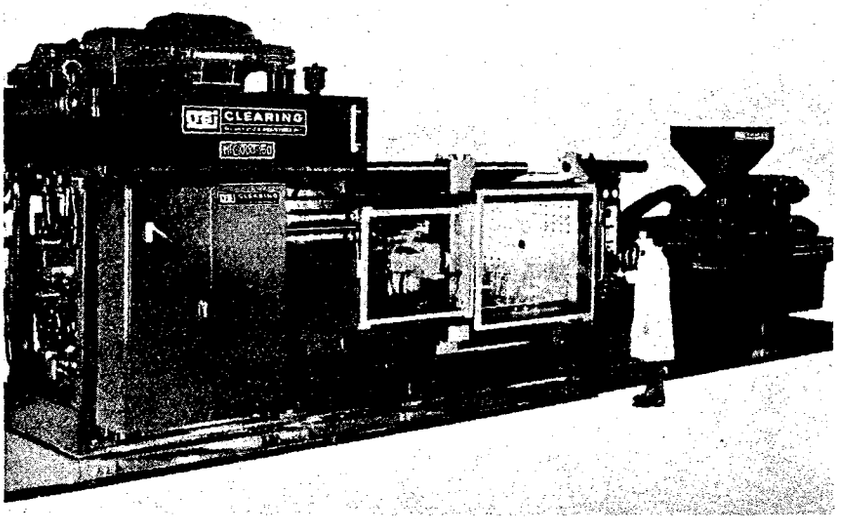


High-speed clamping expedites production

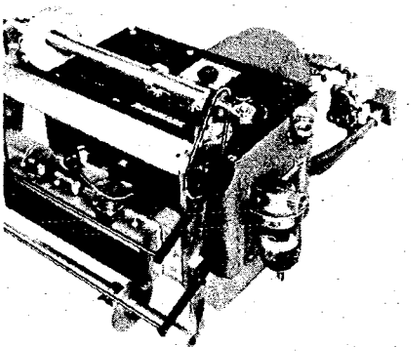
Six standard horizontal injection-molding machines have clamping tonnages from 800 to 2500 tons and shot capacities from 68 to 350 oz. The injection unit is hydraulically driven, either directly or through a gear-reduction unit.

The 100-ton unit, equipped with a 4-inch screw and a 100-oz shot, has a recovery rate of 730 lb/hour of styrene. Maximum injection ram speed is 327 in/min, and injection time for a full shot at full pressure is 2.7 sec.

A fast-acting prefill valve system provides for quick opening and closing strokes of the clamping unit. The clamping stroke is 46 inches, and maximum mold size is 60 by 40 inches. U.S.I. Clearing, 6499 W. 65th St., Chicago, Ill. 60638. **225**



Hot-stamping unit integrates parts in single package



Unified power head for hot stamping performs a variety of secondary operations including decorating. Model 630 power head is an integrated unit incorporating all controls and functional parts in a single machine. Dwell control, temperature control, pressure and speed controls are panel mounted. Foil pull with scrap rewind is automatic and adjustable. The power cylinder is rated at 3.7 tons with 150-psi air pressure. The Acromark Co., 53 Locust Ave., Berkeley Heights, N. J. 07922. **227**

DSW 588077

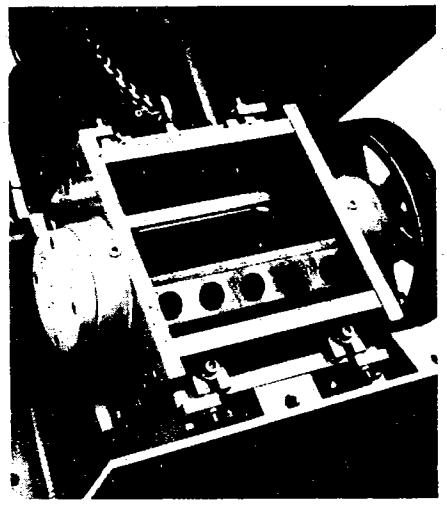
STLCOPCB4093413

QUIET!

EASY TO CLEAN

Cumberland plastics granulating machines for years have been setting the standards for efficient and reliable reclaim of scrap over the full range of thermoplastic materials.

Now, several new models offer the advantage of protection from noise pollution. We call them our Peterson(™) Models. Equipped with Cumberland's exclusive method of sound insulation, they reduce noise level to well within the limits imposed by the Walsh-Healey Act . . . and make the quality of the noise far more acceptable to employees. Ask about the models available for your operation.



The Cumberland line of granulating machines is the widest, most rugged available. It ranges from compact models for beside-the-press installations to the giant "work horses" used in centralized reclaiming operations. Bulletin 700 gives details. For your copy, contact your nearest Cumberland field engineer or phone the factory . . . 401 728-1600.

Cumberland Engineering Company Inc., Box 6065, Providence, R.I. 02904. Direct factory technical and engineering assistance available from Providence, New York, Philadelphia, Atlanta, Cleveland, Detroit, Chicago, Houston, Los Angeles and Ontario.

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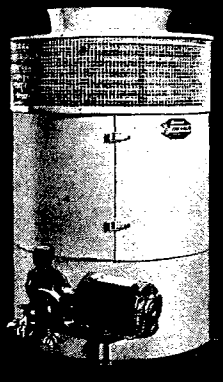

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Title

Company

Address

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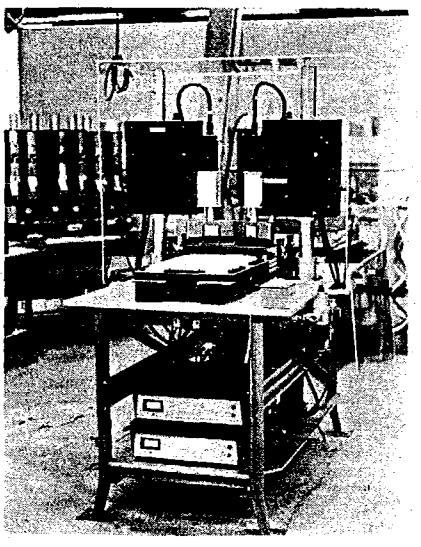
CIRCLE 40

Scan technique welds large parts ultrasonically

With ultrasonic scan welding, a new technique of assembling large, flat, rigid thermoplastic parts rapidly, parts of any size move under stationary welding horns at 15 to 30 ft/minute. Easily adaptable to automated production or existing conveyor systems, scan-welding equipment is used for such large parts as doors or panels for appliances and cabinets. Branson Sonic Power Co., Eagle Rd., Danbury, Conn. 06810. **228**



Solid-state controls hike blow-molding output, accuracy

Bekum Model HBV-121 automatic blow-molding machine is equipped with a solid-state electronic control system. The large-volume unit produces plastic bottles and containers from under 1 pint to 5 gal for foods, cosmetics, beverages and similar consumer and industrial products. Each of the dual mold-closing systems on the HBV-121 can take one-, two-, three- or four-cavity molds depending on the size, shape and plastic material involved. Using double-cavity molds, for example, the unit will automatically blow, trim and finish 1-qt PVC bottles at the rate of 1800/hour. Solid-state digital timers control the entire operating cycle and electronic temperature controllers keep processing temperatures to close tolerances. C. Tennant, Sons & Co., of New York, Omni Div., 100 Park Ave., New York, N.Y. 10017. **229**

R

WHICH WAY RUNS YOUR 20-20?

Is it to *hind*sight, common to all us humans, or are you one of that gifted breed with ideal *fore*sight?

We often wonder, on those occasional moments of *in*sight along with pondering the state of things, whether RAM is truly embarked on a proper course of discipline . . . or whether we should meekly knuckle under to the less savory facts of economic life.

RAM is closely approaching its silver anniversary in manufacturing FRP raw materials. The biggest reason we are still around: doing our darnedest to make things better instead of cheaper. Plenty of companies sell lots more gel coat than we do, usual reasons being that they sell theirs for less money. If you don't care about tomorrow, it *may* be a good bargain. But . . .

Have you ever had to scrap or repair one shower stall, or a yacht hull, or some similar costly part due to a gel coat failure? Do you do it very often?

Maybe just once in a hundred molding cycles, and you've more than charged yourself the slight added cost of what we conscientiously believe is closest to being an "idiot-proof" formulation. You almost have to mistreat ours with malice aforethought to get a failure. At least, that's what people *tell* us, from "down Maine" to sunny SoCal.

Frankly, we do "lose" customers fairly often to the blandishments of a price-seller. But when they come back later on, then we're *both* happy about RAM.

Care to switch over to foresight?

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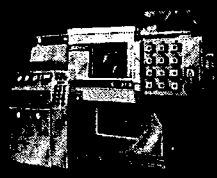
Gardena, California 90248
FA 1-0710 (Area 213) DA 3-8640

CIRCLE 41

STLCOPCB4093415

60% savings with plastic bottles.



Incredible! Not when you mold them in your own plant at 60 bottles a minute on REED's new 100-IB injection blow molder. With it you can turn out 20 million bottles a year. No wonder cost-per-thousand is so low – $9.54 compared to $24 for this 3-ounce bottle in glass, and $27 for custom-molded plastic.

And what perfect styrene bottles! Completely finished . . . clear or colored . . . sizes up to a pint for dry products, paste, or liquids . . . feather light yet strong . . . with precision-molded necks to take any common closure. Since finishing operations are unnecessary, production costs are lower.

What's more, switching to plastic bottles cuts shipping costs and breakage losses too. And in-plant molding eliminates inventory problems and shipping delays.

If you think 60% savings is unbelievable, we'll be happy to send you a copy of an industry-wide cost study to back it up. Better yet, we'll make a no-obligation cost analysis of your operation and quote what in-plant molding with the 100-IB will save you. For details contact your local REED branch office, or write: **Reed-Prentice Division, Package Machinery Company, East Longmeadow, Mass. 01028.**

REED®

Branch offices: New York • Philadelphia • Cleveland • Buffalo • Detroit • Chicago • Atlanta • Los Angeles • San Francisco • Kansas City • Ft. Lauderdale • Toronto



DSW 588080

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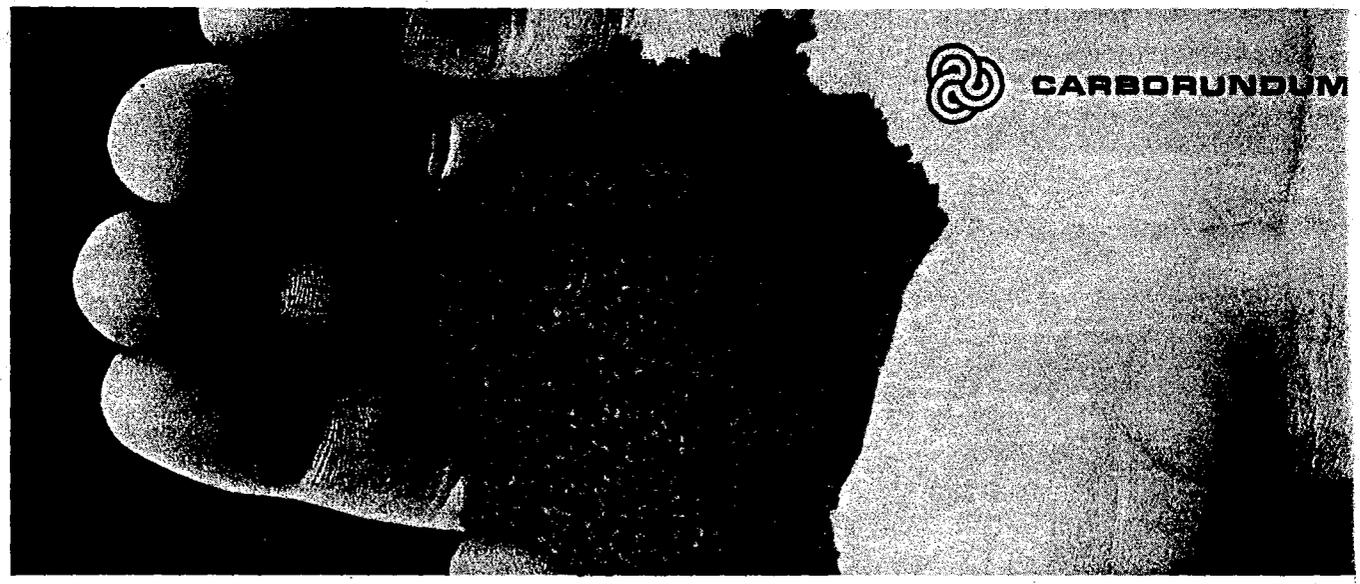

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Polyblast eliminates the wiping operation, because it deflashes dust-free. Substantially reduces the dislodging operation, because it resists lodging in crevices. If some lodging does occur, the brilliant green color helps you spot particles instantly.

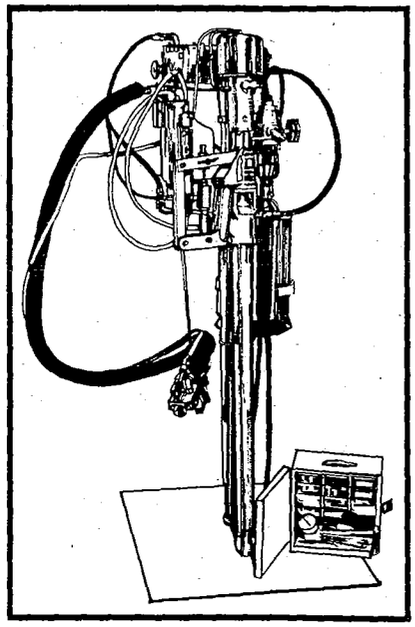
Because Polyblast lasts at least fifty times longer, it actually costs *less* than what you're using now.

For details, call or write: Pangborn Division, The Carborundum Company, Dept 4100, Hagerstown, Maryland 21740.

PANGBORN

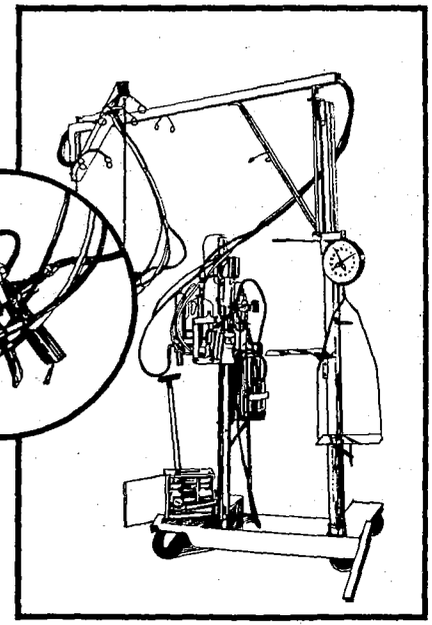
CIRCLE 43

Increase production and cut costs by using Venus FRP spray equipment



The controlled pattern and low fume generation made possible by the VENUS internal mix low pressure airless system cuts catalyst use up to 50%; resin use cut up to 10%. The fog free working environment possible with the VENUS system makes for more productive operating personnel too. For the details about how VENUS can help you build better FRP products for less money in a cleaner and more productive shop, complete the reader service card. Or write us direct.

CIRCLE 16



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For years, our Thermolite 31 stabilizer has been the standard of the PVC pipe business. Its days are numbered.

New Thermolite* 31-SUPER stabilizer for rigid PVC pipe, fittings, sheet and profiles does everything that regular Thermolite 31 can do – only better.

Reduces stabilizer cost up to 20%

An exciting new advance in butyltin stabilizers, Thermolite 31-SUPER is even more economical to use than regular Thermolite 31. Commercial field applications have shown that it can be used at levels up to 20% lower!

Yet even at these low concentrations, Thermolite 31-SUPER shows the same excellent heat stability, compatability and high temperature processability that have made regular Thermolite 31 the leader.

Brighter whites, better gloss

In fact, the appearance of rigid PVC pipe and other products stabilized with Thermolite 31-SUPER is actually improved. Especially in white pipe, where improved early color protection and better color control allows extended extrusion runs to be maintained, producing more uniform color both across the pipe and pipe stack as well. The physical appearance of the pipe is also improved through controlled surface gloss development of the pipe walls.

No reformulation

So if you're using Thermolite 31 now, move up to Thermolite 31-SUPER. It will save you money, and you won't even have to reformulate. If you're not already using Thermolite 31, start off right with Thermolite 31-SUPER and start enjoying increased savings, improved pipe appearance and extended extrusion runs.

For more information and samples, call or write Ed Wonsicki at (201) 499-2405, M&T Chemicals Inc., General Offices, Rahway, New Jersey. *Trademark of M&T Chemicals Inc.

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DSW 588082

CIRCLE 54

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CWB

C.W. BRABENDER INSTRUMENTS, INC.
50 East Wesley Street
South Hackensack, New Jersey 07606

CIRCLE 45

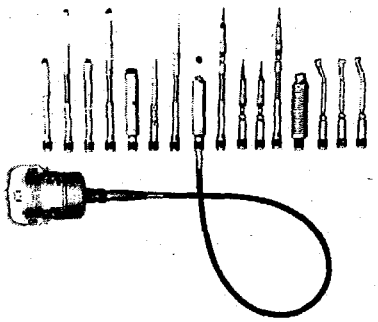
new machinery

220-Ton unit offers remote controls

Model 220 injection-molding machine eliminates limit switches in the control of clamp and injection functions. All major machine functions are controlled from a panel located at the operator's normal work station and the entire system is compatible with computer operation of the machine. Model 220 offers 220-ton clamp force, 20-inch tie-bar gap, 20-inch clamp stroke, 22-inch mold thickness and 22-oz shot size. New Britain Plastics Machine Div., Litton Industries, New Britain, Conn. 06050. **230**

Miniature tools handle tiny tasks

Miniature rotary tools for special purposes include abrasive points, grinding wheels, brushes and tiny saws. A power screwdriver with a self-contained bench mount handles a variety of fastening tasks for plastics and other materials. Foredom Electric Co., Bethel, Conn. 06801. **231**



System tests tension, compression in material research

High-strain rate-test system, Series 819, delivers linear velocities as high as 50,000 in/min. Designed for research applications, the systems can be used to study the effects of very high-speed loading on material properties. In addition, the system allows both tension and compression testing in the same test space without special fixtures. With minor changes, fatigue can be tested. The effect of high rate compression on materials subjected to high-speed forming operations also can be studied. The 819 has load capacities up to 300,000 lb with minimum load of 40 oz. MTS Systems Corp., Box 24012, Minneapolis, Minn. 55424. **232**

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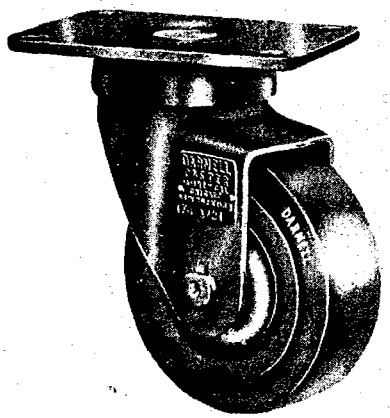
WHEN YOU BUY

DARNELL
CASTERS & WHEELS
WITH ADIPRENE
TREADS



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Abrasion resistance—plus hardness, resilience and load-bearing capacity. . Resistance to oil, grease, oxygen, ozone, many chemicals and solvents. . Non-marking! Won't scratch or mar floor surfaces. . Low Roll Resistance makes for easy movement of heavy loads.

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CIRCLE 46

STLCOPCB4093419

Yours free! Crucible's five-point guide to profitable textured-mold making.

Molds for texturing plastic to resemble wood, leather and other surface patterns are difficult to produce. Unless certain precautions are taken, moldmakers can be faced with costly repairs, reworking or even scrapping hundreds of hours of talented labor.

Bill Young, one of the Crucible technical service consulting staff, has developed a five-point program for better textured molds.

It starts with (1) proper tool steel selection. The steel must be uniform in structure, density and hardness or an uneven pattern will result. It must be clean. Inclusions etch differently and cause pitting. With warranted Crucible CSM #2 tool steel, you can go on to point (2) with confidence.

When two or more steel molds are used to make a single plastic assembly, they should be made from the same heat of steel and, where possible, from the same bar of steel. Molds of different chemical composition will produce parts that don't match.

Helpful information on (3) machining stresses, (4) welding and (5) retempering is also included in the guide.

If you produce molds for textured plastic, or intend to, Crucible Densified CSM#2 and the five-point guide can save you time, aggravation, and a lot of money. Write for your copy.

Colt Industries **Crucible Specialty Metals Division**
Box 977, Syracuse, N.Y. 13201



DSW 588084

STLCOPCB4093420

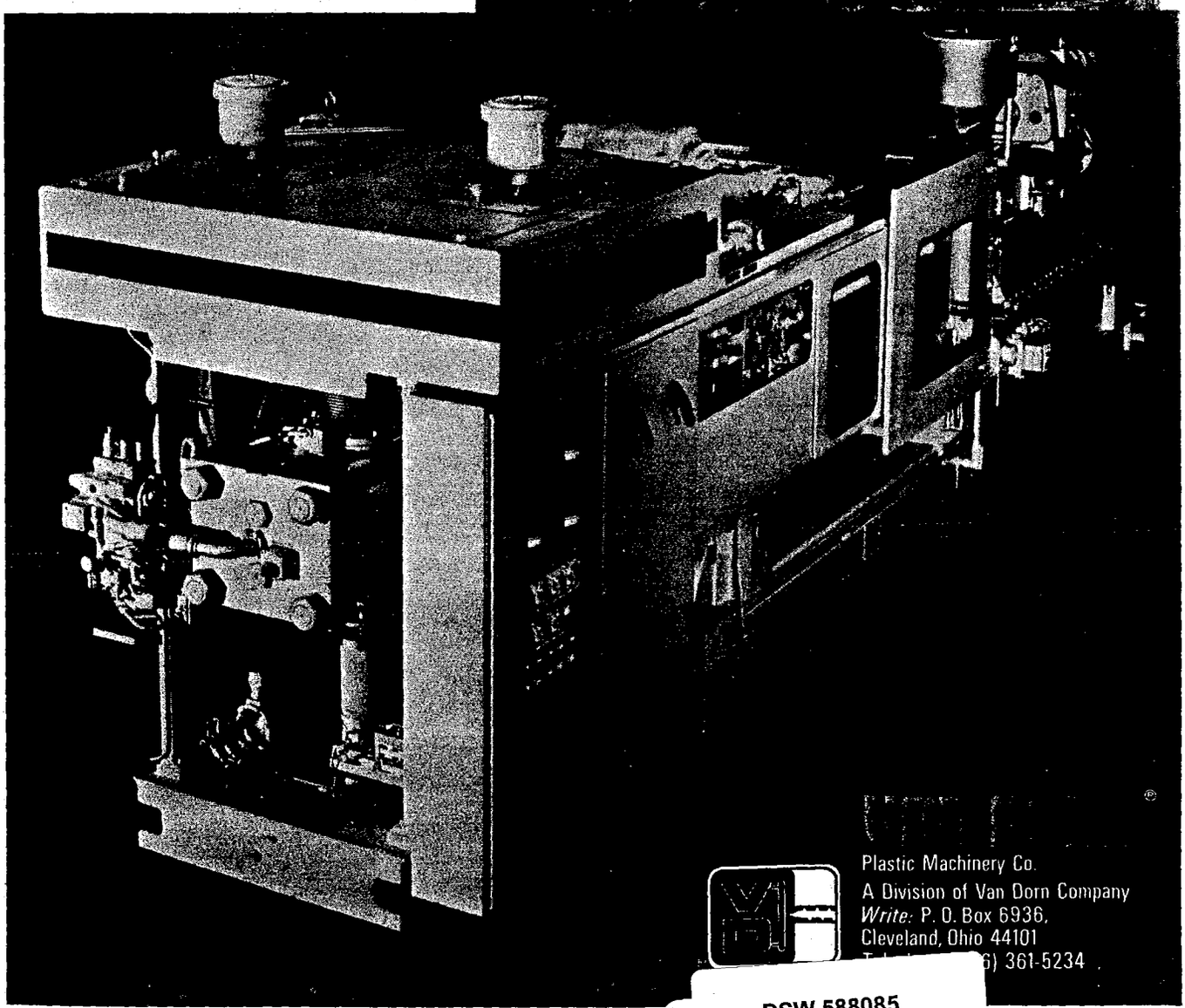
Newest choice among the Van Dorn performers, the 650H-RS-75 has everything you need to mold fast and profitably. Like 650 tons clamp force, selection of 60, 75 or 100 oz. shot capacities and a high torque screw unit that delivers high quality homogenous melts at lowest temperatures. Plus extra-fast cycling due to a unique hydraulic pre-fill valve system that rapidly builds up clamp force for an almost instantaneous injection phase. Add generous 30½" x 30½" tie bar spacing, a long stroke that eliminates ram spacers, fast 1425"/min. closing and 1130"/min. opening speed and you've got a profit producer that keeps production purring.

And get this...Van Dorn provides time and money-saving features *as standard* that you'd pay extra for on other machines. Like an air-supported pivoting screw unit, hydraulic plate ejector and operator-protecting safety bar.

The 650H-RS-75 is in the field and running now. To see its stripe, call your Van Dorn representative. He'll supply details and Bulletin 10170. Or—contact us direct on the 650H or any of the other 75 thru 700 ton injection molding money-makers made by Van Dorn.



A Different Breed ...The New VAN DORN 650H



Plastic Machinery Co.
A Division of Van Dorn Company
Write: P. O. Box 6936,
Cleveland, Ohio 44101
[illegible]6) 361-5234

DSW 588085

CIRCLE 48

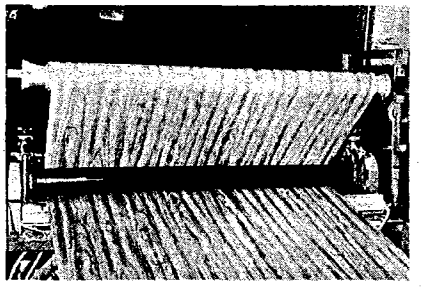
STLCOPCB4093421

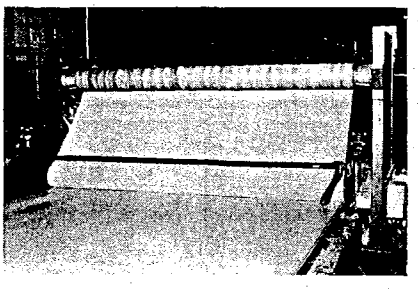
new materials

Film adhesives slow flame spread

"Bostik" 207 low-heat-activated, flame-retardant, preset film adhesives meet or exceed ASTM and FAA flame-retardancy specifications. They are used for bonding decorative materials such as polyvinyl-fluoride films and vinyls in the aircraft, automotive, modular housing and furniture industries.

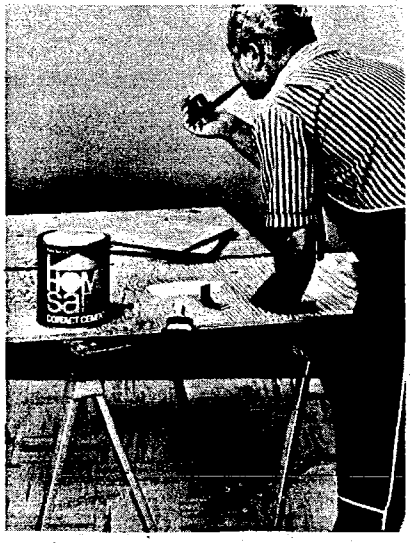
Low heat (125F minimum) is required to activate the adhesives, a critical consideration for thermoplastics. The preset thickness characteristic of "Bostik" 207 film adhesives assures a uniform coating and a permanent bond. The material comes in unsupported films in 2- and 3-mil gages and supported films in 5-, 9- and 14-mil thicknesses. USM Corp., Girder Chemical Div., 205 W. Oliver Dr., Marshall, Mich. 49068. **201**





Contact cement eliminates toxicity, flammability

A nonflammable contact cement is nontoxic and is not damaged by freeze-thaw cycles. It is said to have greater bonding strength than other latex-based cements. "Home Safe" cement can be cleaned up with water and will not damage finished surfaces. Weldwood Packaged Products, 2305 Superior Ave., Kalamazoo, Mich. 49003. **200**



Thixotropic line adds low-hydrocarbon thickener

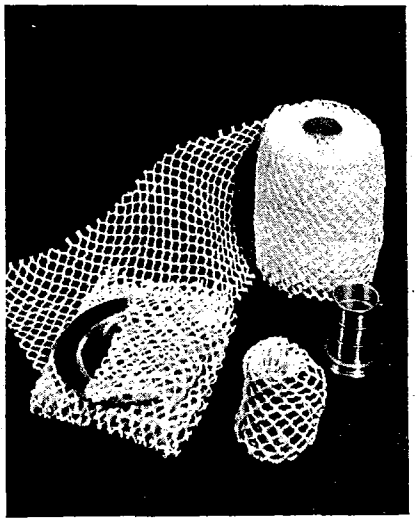
"Ircogel" 2355 is a new low-hydrocarbon analog in the "Ircogel" 900 series of liquid-form thixotropic thickeners. The new material is a calcium metallo-organic complex having ultrasmall micelles dispersed in polar solvents—trichlorenthane and acetone. Potential uses include thickening and flow control of plastics and adhesives in polar solvent systems. The Lubrizol Corp., Box 3057, Cleveland, Ohio 44117. **202**

Three materials gain UL ratings

"Nylode" NY-1/ASF/20, an asbestos-reinforced nylon molding compound, has been rated for use in 1/16-inch thickness up to 110C. "Nylafil" G-1/30/FR, a flame-retardant, long-glass-reinforced 6/6 nylon, now is classified self-extinguishing (SE-O). "Zerefil" G-700, long-glass-fiber-reinforced flame-retardant thermoplastic molding compounds, also have earned an SE-O rating. Dart Industries, Inc., Fiberfil Div., Evansville, Ind. 47717. **203**

PE foam stars as packaging material

A versatile packaging material, "Cellu-Cushion" polyethylene foam, is designed to perform under any loading factor. Two thicknesses, 1/8 and 1/4 inch, are offered in rolls or cut-to-size sheets. Tests show that "Cellu-Cushion" is nonabrasive, heat-sealable, nondusting, noncorrosive, light weight and shock-absorbent. Cellu-Products Co., Patterson, N.C. 28661. **204**



Nylon 6/12 boasts three degrees of reinforcement

The "Thermocomp IF" line includes formulations with 25-, 35- and 45-percent glass-fiber reinforcement. All meet requirements of Federal Specification L-P-395b. These glass-fortified resins are characterized by low moisture absorption, dimensional stability and high impact strength. The "IF" series could be a replacement for metals in engineering applications because of economies provided by lower density, higher strength-to-weight ratios, dielectric properties, corrosion resistance, wear resistance, colorability and elimination of secondary finishing. LNP Corp., 412 King St., Malvern, Pa. 19355. **205**

DSW 588086

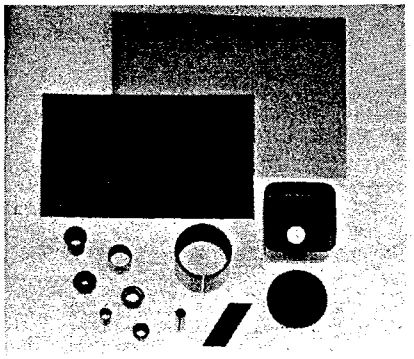
STLCOPCB4093422

Lubricant line enters U.S. market

The Neynaber line of "Loxiol" internal and external lubricants used throughout Europe now is being distributed in the United States. The additives are used in resin systems including phenolics, acrylics and polyamides, as well as rigid, semi-rigid and flexible PVC. They are suitable for processing equipment and food-packaging applications. Standard Chemical Products, Inc., Chemical Specialties Div., 1301 Jefferson St., Hoboken, N. J. 07030. **206**

Process laminates 'Teflon' to steel or aluminum strips

Thin sections of "Teflon" and "Rulon" between 0.002 and 0.010 inch can be continuously laminated to thin strips of steel or aluminum. The laminate produced by this process is said to be less expensive than an equal thickness of "Teflon" or "Rulon". It also is said to be superior to ordinary TFE coatings in that it can be made to required thicknesses for specific conditions of wear, insulation or chemical exposure. Dixon Corp., Bristol, R.I. 02809. **207**



electrifying offer

3M can show you how to get rid of static in the time it takes to fill in the coupon.

Our demonstration is fast. Convincing. One you'll want to see if static electricity is bugging your production or processing.

3M Brand Static Eliminators are self-powered nuclear devices. No wiring or electric power needed. No fire or explosion hazard. So small in size they fit almost anywhere. Easily movable from place to place on the same machine or to different machines. And there's a full line of 3M Static Eliminators designed to solve almost any static problem.

If you truly have bothersome static, we'll be happy to put on our fast demonstration. Just fill in and mail the coupon.

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Nuclear Products 3M COMPANY

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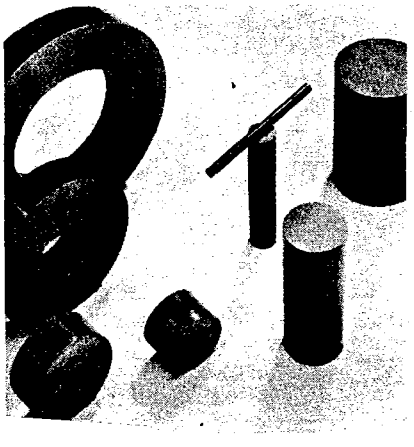
PA resins demonstrate olefin capabilities

Polyanhydride resins derived from alpha olefins and maleic anhydride in four copolymer types are white powders of low molecular weight and low viscosity. Melting points range from about 95 to 155C in these curing agents for epoxy resins in adhesive formulations and reinforced plastics. Physical properties suggest that PA resins also will be valuable intermediates in the preparation of detergents and cleaners, water-treatment chemicals, paper coatings, protective coatings and adhesives. Gulf Oil Chemicals Co., Drawer 2100, Houston, Tex. 77001. **208**

CPVC stock gains new sizes

Fourteen sizes of solid round bar and 12 sizes of hollow bar in chlorinated polyvinyl chloride increase this company's stock product line. The material has a design stress of 500 psi at 180F and machines readily. Harvel Plastics, Inc., Box 757, Easton, Pa. 18042. **209**



CIRCLE 49

DSW 588087

STLCOPCB4093423

IMS BULK MOLD RELEASE SPRAYERS

LOW COST PARTING AGENT DISPENSERS HELP YOU KEEP MOLD RELEASE COSTS DOWN....USE WITH ANY BULK SOLUTIONS

FOR MOLD RELEASE USERS WHO SAVE BY FORMULATING THEIR OWN PARTING AGENTS

Hose to Bulk Supply



SELF POWERED

IMS Gas Powered Sprayer Kit No.V-1 includes one dozen Power Units with 20 foot feed hose and check valve.

PRICE: KIT V-1....$15.00

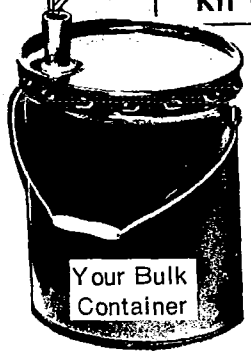
AIR POWERED

Kit G-1



Air Powered Sprayer Kit G-1 includes Hand-gun with Sprayhead, 10 ft. air hose, 20 ft. supply hose and check valve.

PRICE: KIT G-1....$48.50



IMS SPECIAL KITS LET YOU COMPARE AIR AND FREON TYPE SPRAY-MAKERS USING YOUR OWN BULK SUPPLY!

IMS also offers a complete line of Bulk Mold Releases and Solvents for use with the above dispensers. A fully priced Bulk Mold Release Catalog is sent FREE with each sprayer.

Handy Refillable Bottles!

Fully Portable Gas Powered Spraymaker.



Kit VB-1

Includes one dozen High Powered Freon Units and one dozen refillable graduated bottles.

PRICE: KIT VB-1...$17.00

Now! Blend your own...

PARTING AGENTS AND CUT DISPENSING COSTS WITH THE IMS



Air Powered Bulk Mold Release Spraymaker.

Kit G-2 includes the new IMS Air Powered Sprayer with 10 foot air hose 1/8" NPT fitting and one dozen refill-able graduated bottles.

PRICE: KIT G-2 $37.00



Order an IMS Bulk Mold Release Sprayer Kit Now! Evaluate it with your own present bulk parting agent solution.....**OR TRY OURS!**

YOUR ONLY SUPPLIER FOR EVERY TYPE OF MOLD RELEASE

IMS COMPANY

24050 COMMERCE PARK ROAD CLEVELAND, OHIO 44122 PHONE 216-464-0400

FORMERLY INJECTION MOLDERS SUPPLY COMPANY INC.

CIRCLE 50

E 51 →

DSW 588088

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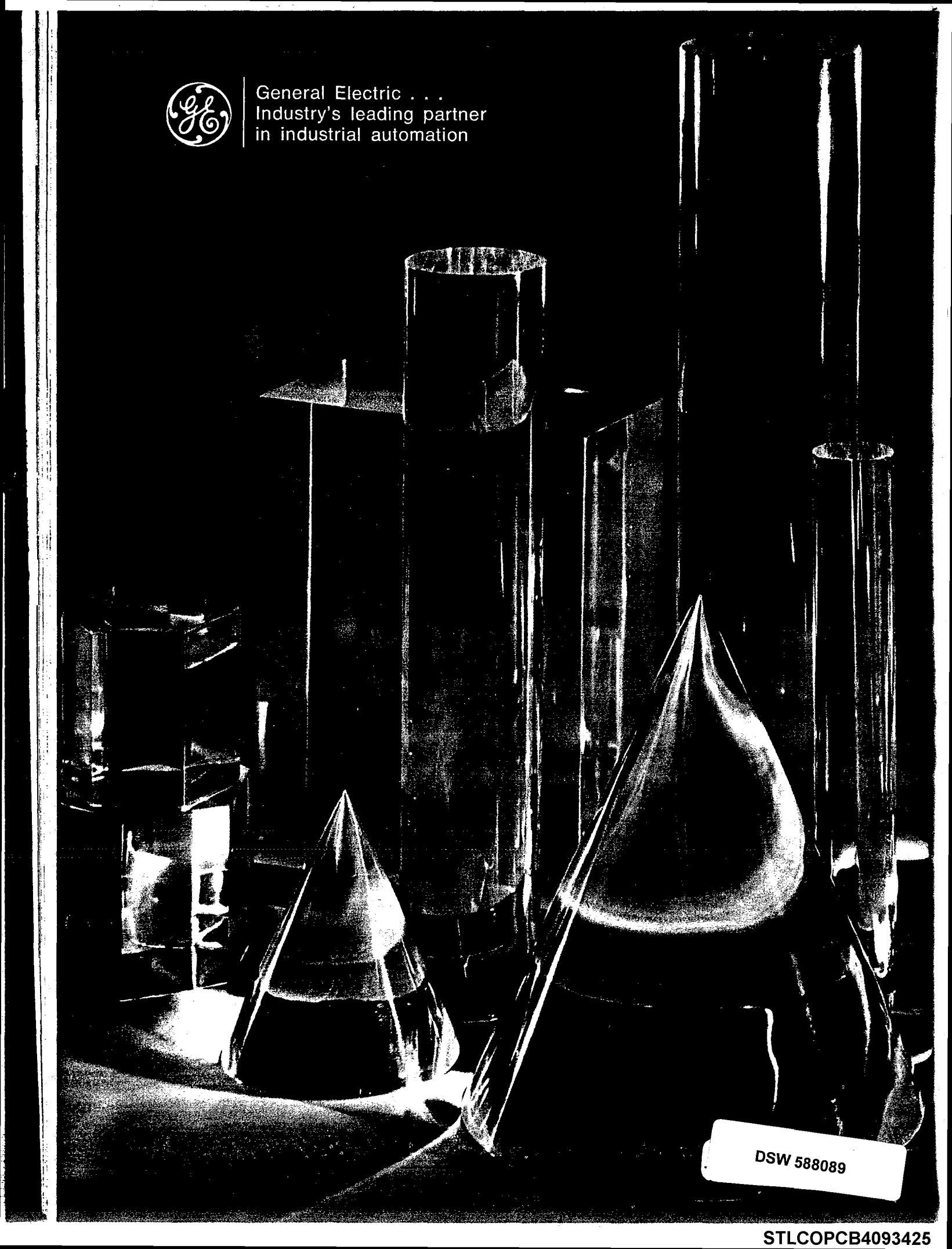
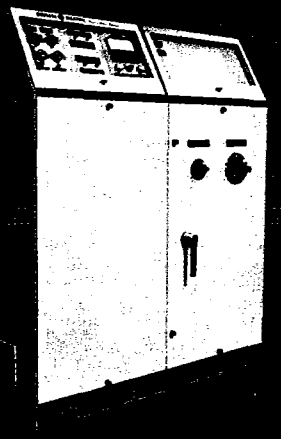


STLCOPCB4093425

Plasti-Matic*Control: General Electric's totally new dimension of quality in plastic machinery automation

General Electric's Plasti-Matic Control is a brand new total-systems concept in solid-state accuracy, designed specifically for all types of plastic molding machines. This new, exacting control system offers you substantial savings through a reduction in maintenance, increased machine productivity, reduced scrap, and direct material savings. Further, General Electric training and service are available to increase the efficiency of your service functions and to improve your manufacturing operation.



And that's only the beginning! Whatever your plastic forming process, Plasti-Matic Control can make a good thing better. Major machinery manufacturers are now in a position to supply Plasti-Matic Control, so contact them today for information and application assistance. Or, learn about the dollar savings specifically available to you by writing for our fact-filled brochure on Plasti-Matic Control, Section 784-53, General Electric Company, Schenectady, New York 12305.

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GENERAL ELECTRIC

DSW 588090

STLCOPCB4093426

Ultrathene® EVA copolymers: When we introduced them we didn't know they were great packaging materials too.

We're a little embarrassed. When we came out with *Ultrathene* ethylene-vinyl acetate (EVA) copolymers seven years ago, we hailed them as versatile design materials that performed like rubber and processed like plastic. Easier to process, better performing replacements for rubber and vinyl.

And they've turned out to be all that. And more. Because what we're finding out every day is that *Ultrathene* EVA copolymers are also being used very successfully in a number of different ways as packaging materials. For instance:

In films for poultry and meat product packages, they contribute as good or better low temperature impact strength and clarity as polyvinyl chloride does. *Ultrathene* EVA copolymers meet the FDA's standards for food packaging and incorporate no plasticizers.

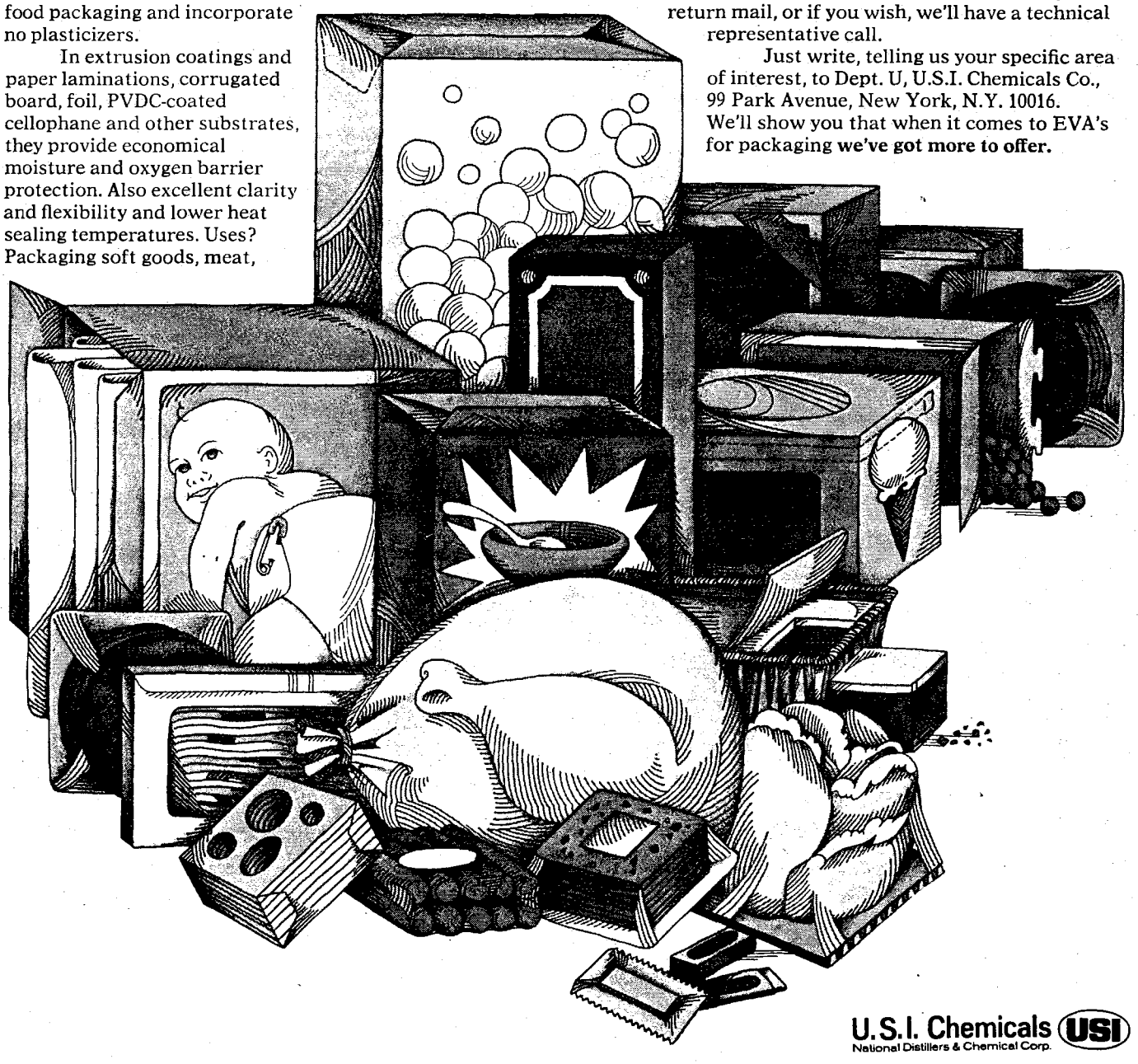
In extrusion coatings and paper laminations, corrugated board, foil, PVDC-coated cellophane and other substrates, they provide economical moisture and oxygen barrier protection. Also excellent clarity and flexibility and lower heat sealing temperatures. Uses? Packaging soft goods, meat, fish, dairy produce, bakery and frozen food products.

In hot melts, *Ultrathene* EVA copolymers added to paraffin waxes and other additives contribute flexibility and gloss in board and carton coatings and give essential tackiness in adhesives used in such things as cereal boxes and chewing gum wrappers.

Now that we think of it, we really should have known that *Ultrathene* EVA copolymers were a natural for packaging applications. They're tough yet flexible without plasticizers, have excellent clarity and low temperature performance, good heat sealability and lend themselves to high processing speeds.

There's no need for you to wait seven years to find out what an asset *Ultrathene* EVA copolymers can be to your package. We'll send you the information by return mail, or if you wish, we'll have a technical representative call.

Just write, telling us your specific area of interest, to Dept. U, U.S.I. Chemicals Co., 99 Park Avenue, New York, N.Y. 10016. We'll show you that when it comes to EVA's for packaging **we've got more to offer.**

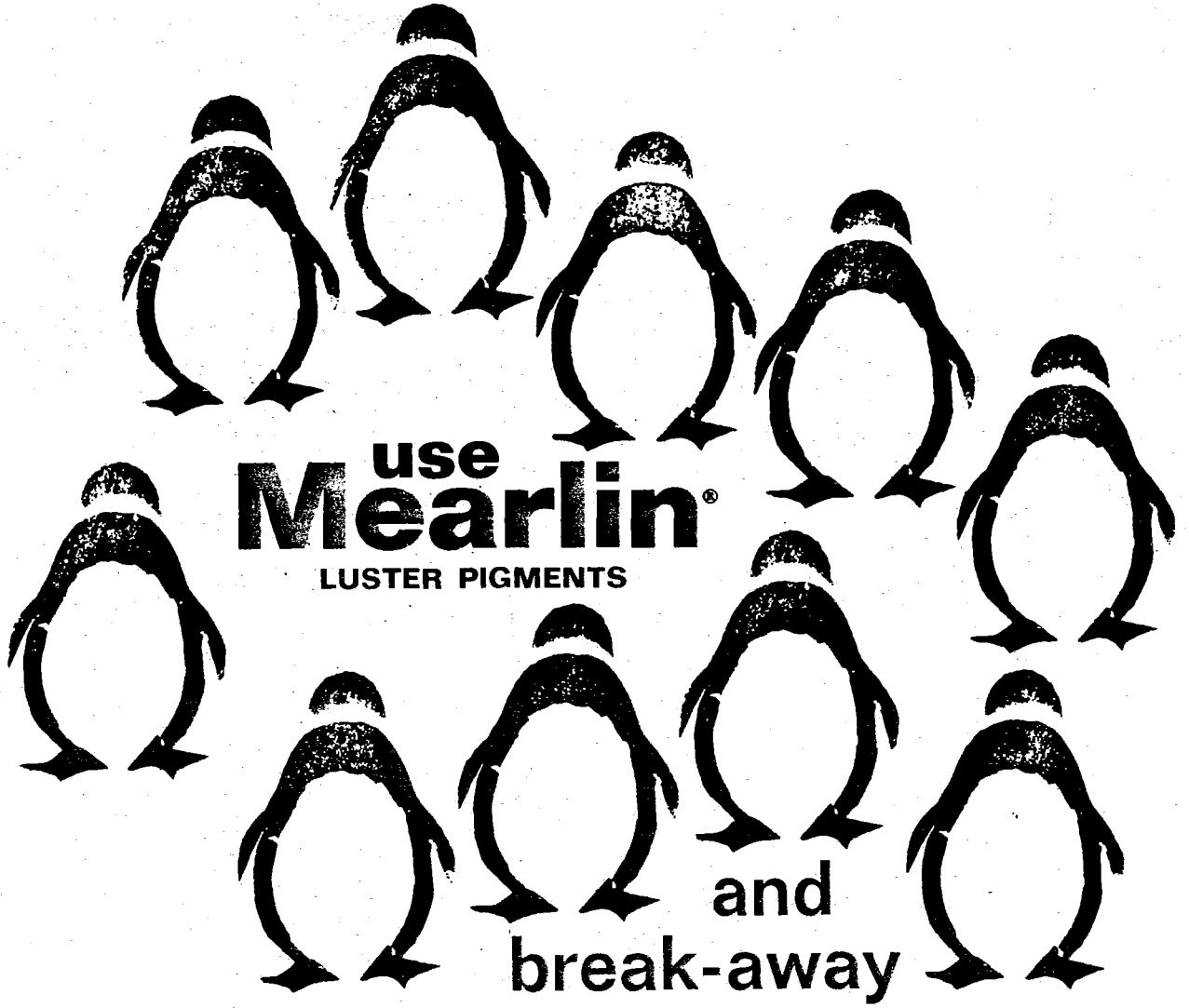


U.S.I. Chemicals USI
National Distillers & Chemical Corp.

DSW 588091

CIRCLE 14

STLCOPCB4093427

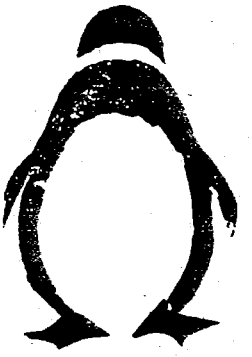


use Mearlin®

LUSTER PIGMENTS

and break-away from look-alike plastics

Manufacturing plastic products is one thing. But, giving them a competitive edge is another. It's here that Mearlin luster pigments can help. Incorporated into thermoplastics and thermosets, or used as a coating, Mearlin luster pigments make ordinary plastics radiantly beautiful. Mearlin Gold, for example, is bright but not brassy. Or, you can achieve visual effects ranging from a soft, lustrous glow to extraordinary brilliance with any one of the Mearlin Whites. And, Mearlin Iridescent Red changes color with every movement of the eye. Creatively, no other pigment or colorant gives you as much freedom to break-away from look-alike plastics. Sample Mearlin luster pigments and prove it to yourself!



IRIDESCENT RED
A shimmering pearl with dual color play that turns from red to green.

GOLD
Lustrous pearlescent effects along with gold pigmentation in two intensities.

PEARLWHITE
A pearl white of good luster.

SILKWHITE
A bright white of greater opacity.

SPARKLE
A glittering sparkling pearl white.

Non-toxic, non-tarnishing, and stable under high temperatures. Available in powder form.

THE MEARL CORPORATION
41 East 42nd Street, New York, N.Y. 10017

CIRCLE 53

DSW 588092

STLCOPCB4093428

This is Bostik.® The fastest, surest way to solve your bonding problems.

Use our Bostik® Quick Adhesive Selector Index. And your Bostik distributor.

	Metals, Glass, Ceramic	Wood, Cardboard, Paper	Rubber (Natural & Synthetic)	Plastics (Rigid & Flexible)	Foams, Fabrics, Leather
Metals, Glass, Ceramic	2292 7068 7080 7087				
Wood, Cardboard, Paper	1142 3045 4034 7068	2014 8300 8400 8901			
Rubber (Natural & Synthetic)	1015 1142 3045 4030	1015 1142 3045 4067	1125 2003 4585 7074		
Plastics (Rigid & Flexible)	4020 4585 7068 7087	1096 4067 8400 7068	1142 1177 3045 4067	4067 7068 7130 7132	
Foams, Fabrics, Leather	1015 1142 4595 7045	1076 7045 8400 8901	2014 4067 7070 7130	4030 4067 4585 7130	1076 1177 4030 7045

Simply cross-match the substrates you want to bond. The Bostik adhesives specially formulated for your application are listed in the appropriate block.

You can count on these adhesives. They've been selected from the more than 500 formulations we've developed in our labs. They're the ones that have proved most effective for a wide range of bonding requirements. There's one with the exact properties to solve your toughest problem.

There's a Bostik Distributor near you, to give fast service and supply you with Bostik adhesives.

He stocks these selected formulations ready for immediate delivery to your plant . . . packaged for easy use. Even a selection of all-purpose adhesives in handy applicator tubes.

Your Bostik distributor knows what Bostik adhesives can do. He's well qualified to help you choose the right one for your job . . . and show you how to engineer your assembly for best bonding results.

Think you have an especially tough bonding problem? Challenge him.

Look up the Bostik adhesives you need in the Selector Index. Then look up your Bostik distributor in the Directory opposite. It's the fastest, surest way to get the best in industrial adhesives. USM Corporation, Chemical Division, Middleton, Mass. 01949.

USM Corporation
Chemical Division



This is USM.

DSW 588093

STLCOPCB4093429

This is where to get Bostik® industrial adhesives

CALIFORNIA
Berkeley: R. S. HUGHES CO., INC.
2818 Eighth St. 94710. (415) 841-0522
Long Beach: NORTHWEST PLASTICS INDS.. INC.
1425 Magnolia Ave. 90813. (213) 437-2515
Los Angeles: ELECTRICAL SPECIALTY CO.
2820 East 12th St. 90023. (213) 269-9511
Los Angeles: R. S. HUGHES CO., INC.
5301 East Sheila St. 90022. (213) 268-2501
Mountain View: R. S. HUGHES CO., INC.
620 National Ave. 94040. (415) 961-3700
Orange: R. S. HUGHES CO., INC.
346 N. State College Blvd. 92668. (714) 639-4444
San Carlos: AD-PAK MATERIALS CO.
890 Montgomery Lane 94070. (415) 592-6555
San Diego: R. S. HUGHES CO., INC.
3606 Midway Dr. 92110. (714) 224-2431
San Francisco: ELECTRICAL SPECIALTY CO.
213 East Harris Ave. 94080. (415) 589-9611
CONNECTICUT
Newington: I. B. MOORE CORPORATION
15 Holmes Rd. 06111. (203) 666-5661
FLORIDA
Miami: FLORIDA AVIATION CORP.
Miami International Airport 33148. (305) 887-7571
IOWA
Des Moines: NOTT COMPANY
3821 West 100th St. 50322. (515) 283-1775
KANSAS
Wichita: WICHITA CANVAS SUPPLY, INC.
2937 S. Kansas 67216. (316) 522-3427
LOUISIANA
Baton Rouge: GULF WANDES CORPORATION
8325 South Choctaw Dr. 70815. (504) 927-1920
New Orleans: GULF WANDES CORPORATION
404 Marengo St. 70115. (504) 899-6359
MARYLAND
Baltimore: BALTIMORE CANVAS PRODUCTS, INC.
2861 W. Franklin St. 21223. (301) 947-7890
MASSACHUSETTS
Cambridge: I. B. MOORE CORPORATION
30 Rindge Ave. Ext. 02140. (617) 491-0100
MINNESOTA
Hibbing: NOTT COMPANY
3730 E. Belt Line Hwy. 55746. (218) 263-4458
Minneapolis: NOTT COMPANY
201 North 3rd St. 55401. (612) 333-6501
MISSOURI
St. Louis: RAY ENGEL PACKAGING SUPPLIES, INC.
2326 Centerline Indust. Dr. 63141. (314) 542-3388
NEW JERSEY
Paterson: SOVEREIGN CHEMICAL CO.
180 East Railway Ave. 07503. (201) 684-4800
NEW YORK
Buffalo: CADILLAC PLASTIC & CHEMICAL CO.
2700 Walden Ave. 14225. (716) 684-9200
Manhattan: BEACON CHEMICAL COMPANY
242-244 Lafayette St. 10012. (212) 226-6051
Rochester: CADILLAC PLASTIC & CHEMICAL CO.
295 Buell Rd. 14624. (716) 235-2260
NORTH CAROLINA
Charlotte: AUSTIN CUSHION & CANVAS CO., INC.
1014 N. Graham 28206. (704) 376-7571
Hickory: CAROLINA SOLVENTS, INC.
1015 3rd Ave., N.W. 28601. (704) 327-4319
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2587 S. Arlington Rd. 44319. (216) 644-7183
Cleveland: CADILLAC PLASTIC & CHEMICAL CO.
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Philadelphia: APOGEE INDUSTRIES
West Chester Pike & Providence 19028.
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Pittsburgh: CADILLAC PLASTIC & CHEMICAL CO.
600 Seco Rd. 15146. (412) 372-2202
Scranton: PENA-PLAS COMPANY
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One Waterman Ave. 02901. (401) 434-4122
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818 Little Creek Rd. 23518. (703) 583-5943
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Seattle: NORTHWEST PLASTICS INDS., INC.
6361 First Ave. South 98108. (206) 763-0441
Seattle: R. S. HUGHES CO., INC.
6520 Sixth Ave., South 98108. (206) 767-4463
WASHINGTON, D.C.
Washington, D.C.: POTOMAC RUBBER CO., INC.
24 Kennedy St., N.W. 20011. (202) 882-3063

USM Corporation
Chemical Division

CIRCLE 310

Propionate resin exhibits strength



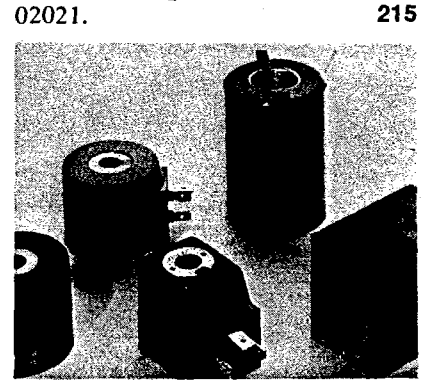
A general-purpose cellulose propionate resin with a hard flow range comes in opaque and translucent colors. The material's physical properties are said to demonstrate high strength in industrial and consumer applications. Reed Plastics Corp., Holden Industrial Park, Holden, Mass. 01520. **214**

Properties of Cellulose Propionate Resin

	Values	ASTM Test Method
Flow temperature, deg F	311	D569
Specific gravity	121	D792
Izod impact strength, ft-lb/inch of notch	6.1	D256
Flexural strength at yield, psi	5500	D638
Modulus of elasticity, psi x 10^5	1.40	D638

Casting resin cures at room, elevated temperatures

"Stycast" 1492 electrical-grade casting resin is a filled, 100-percent solids, two-part system. The filler components of the system are stable and resistant to settling. "Stycast" 1492 will cure completely at room temperature or can be accelerated by heat for short production cycles. Emerson & Cuming, Inc., Canton, Mass. 02021. **215**



Epoxy novolac fills industrial needs

Low-viscosity epoxy novolac is used in adhesives, structural and electrical laminates, coatings and castings to achieve elevated temperature performance and chemical resistance. Viscosity ranges between 1200 and 3000 centipoises. This modified solid resin has properties tailored to transfer molding, adhesive, prepreg and powder-coating markets. Dow Chemical Co., 2040 Dow Center, Midland, Mich. 48640. **216**

One-part urethane laminates film

A one-part, self-curing urethane adhesive for laminating webs of various coated and uncoated films, "Upaco" 792-108, provides bond values of from 300 to 400 gm/inch. Typical materials laminated are plain glassine to treated PP, plain glassine to "Saran"-coated cellophane and "Saran"-coated cellophane to itself and treated PP. With an 80-percent solids content and a viscosity of 2000 to 3000 centipoises at 25C, laminations have excellent clarity. Upaco Adhesives, Inc., 1605 Hyde Park Ave., Hyde Park, Mass. 02136. **217**

Epoxies serve as powder coatings

Three epoxy resins for powder-coating applications can be used for pipe coating, electrical components, metal decoration and automotive uses. "DER 663U" and "DER 664U" epichlorohydrin-bisphenol A-based resins give improved flow, resulting in pinhole-free coatings. "DER 662U" resin offers faster reactivity and improved chemical resistance and edge coverage. Dow Chemical Co., Designed Products Dept., 2040 Dow Center, Midland, Mich. 48640. **218**

Cross-linker provides adhesion

"Polydride 230" dianhydride is designed principally for use with epoxy resins to yield highly cross-linked polymers that have good adhesion and toughness. Possible-end-use areas include molding powders, high-temperature-resistant coatings, laminates and adhesives. R. T. Vanderbilt Co., Inc., 230 Park Ave., New York, N.Y. 10017.

DSW 588094

STLCOPCB4093430

Vinyl plasticizers retard flame spread

"Phosflex" 300 and "Phosflex" 400 provide vinyl formulations with the same level of flame retardancy as traditional aryl phosphate esters. They are said to act with 20 percent greater efficiency and at lower cost. The mixed triaryl phosphate esters contain a halogen and high phosphorus content and provide improved flame retardance and better low-temperature properties. Specialty Chemical Div., Stauffer Chemical Co., 299 Park Ave., New York, N.Y. 10017. **210**

Surfactant boosts lubrication

A silicone surfactant helps polyglycol lubricants spread faster and farther over surfaces to which they are applied to improve penetration and wettability of all contacting surfaces. When L-7001 is added to polyalkylene glycol, the surface tension drops to 22 dynes and lower. Union Carbide Corp., 270 Park Ave., New York, N.Y. 10017. **211**

Potting resin cures fast

Epoxy resin system, the 5000 Series, has been developed for industrial applications requiring minimal processing time for potting, adhesive or sealant applications. The system is available as a refrigerated, one-part formulation with a long shelf life. It gels in 4 to 5 minutes at 250F and sets in 5 or 6 minutes at that temperature. At 300F, the 5000 Series gels in 1/2 to 1-1/2 minutes and sets in 1 to 2 minutes. Solomar Materials, Inc., 2545 Diversified Way, Orlando, Fla. 32804. **212**

Vinyl coatings resist stains

Primerless coatings for metal surfaces are formulated to provide a high degree of stain resistance. During testing, the vinyl organosols have resisted many common stain-producing substances, including ink, coffee and various food stains. The coatings also provide mar and abrasion resistance and enough flexibility that the finished metal can be formed after application of the coating. M&T Chemicals, Inc., Rahway, N. J. 07065. **213**

DIE/MOLD MAKING AUTO-MATICALLY

"THREE WEEKS WORK IN ONE!"
"MOLD CAVITIES UP TO 50% FASTER!"
"REDUCED BENCH TIME!"
"25% DIE COST REDUCTION — N/C OVER CONVENTIONAL EQUIPMENT!"
"DIRECT LABOR COSTS REDUCED!"

These are a few of the comments by shop owners and managers of both small and large shops utilizing Gorton Tape-Master N/C contour mills and Auto-Trace-Master tracer mills for die and mold production. They are producing dies and molds automatically . . . and with improved quality and finish.

In these days when profits are shrinking, labor costs are rising, production efficiency is difficult to maintain, material costs are high and delivery is more demanding . . . you, as a plant manager, need to: 1) drastically reduce production time to produce a finished mold, 2) increase the quality and finish of your product, 3) reduce hand work (bench time), and 4) reduce direct labor costs.

Labor content, both in machine operation and on the bench can be drastically reduced by Gorton's Tape-Master and Auto-Trace-Master. They operate automatically through coffee breaks, lunch periods, and even after hours. The fine finish obtained has a direct effect on the amount of hand work to be done in bench finishing.

Switchable tracing mode permits tracing the die/mold contour in the most efficient tracing/cutting method. Switchable N/C axis control permits cutting right and left hand cavities from the same tape. Profiling the parting line means a more accurate fit and less finishing hand work. Master/Slave multiple spindle designs produce three or more mold sets at a time.

Tape-Master and/or Auto-Trace-Master can be the decisive factor in a "turn around" in the production and ultimate profits of your operation. Proof? Bring your mold and die sections to Gorton. See the results in a demonstration. You too can work automatically — profitably!

THE ONLY ONE

The only builder providing a full range of pantographs, guided tracer millers, automatic tracer millers and N/C contour millers for die and mold machining.

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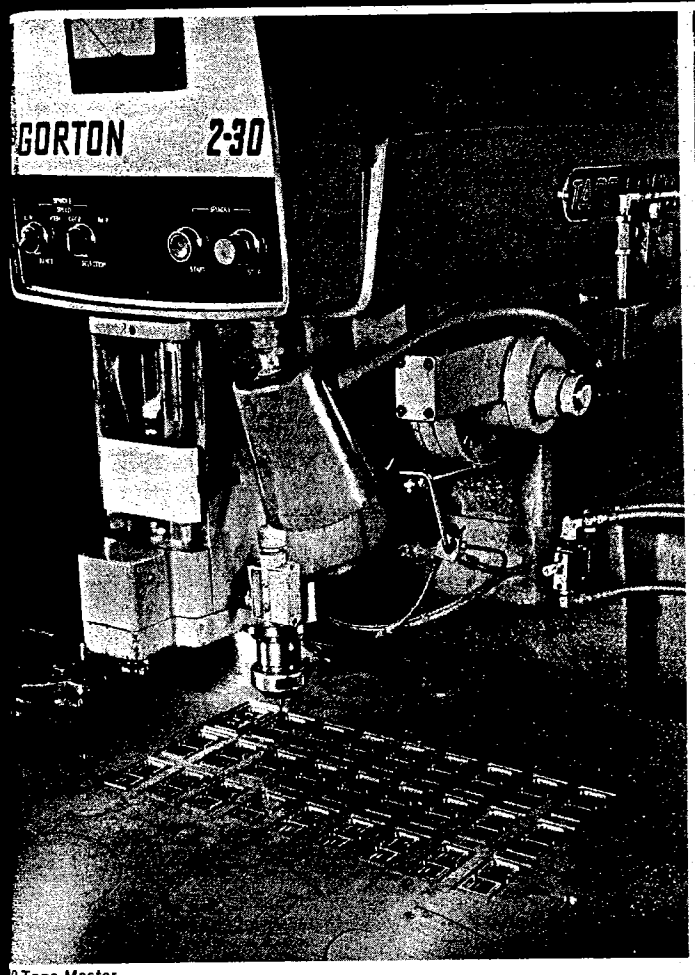
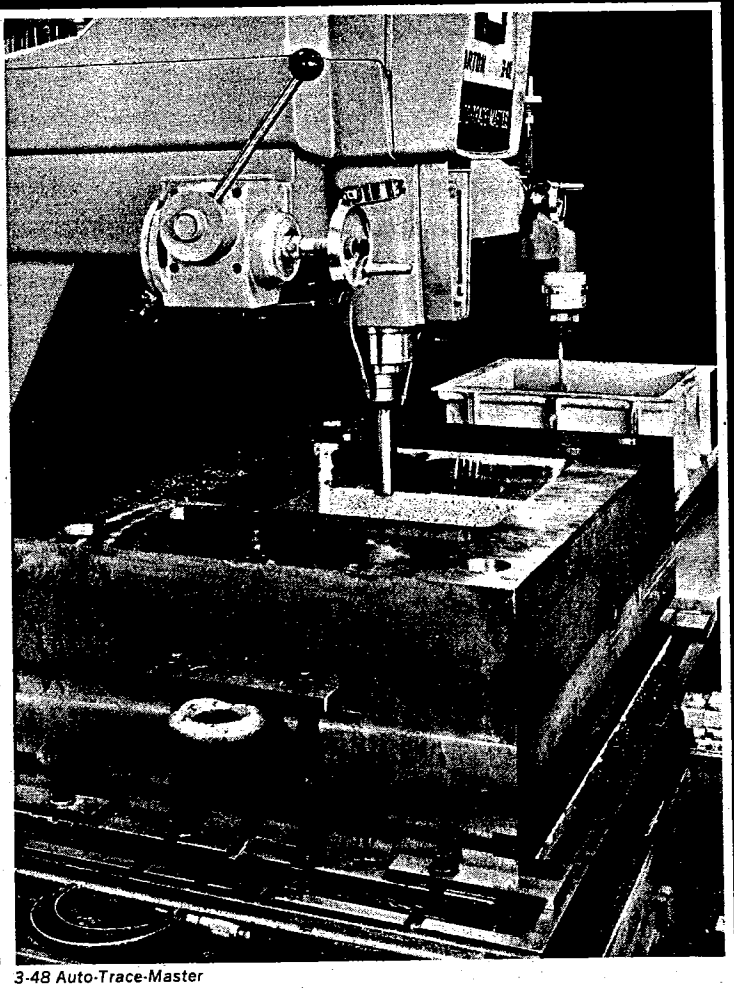
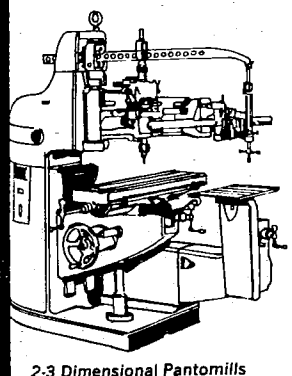


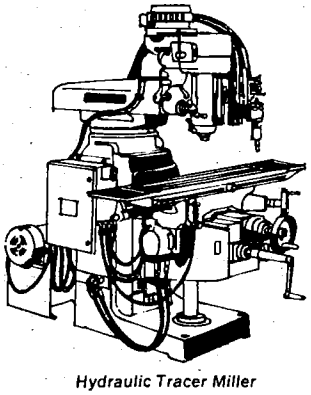
0 Tape-Master



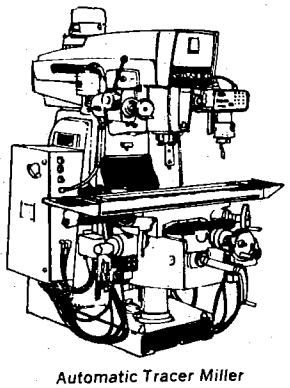
3-48 Auto-Trace-Master



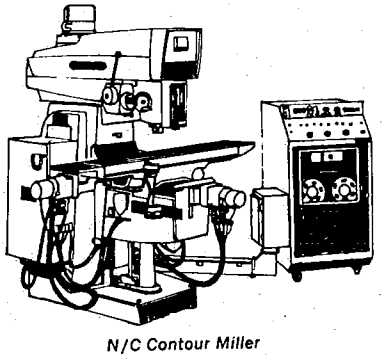
2-3 Dimensional Pantomills



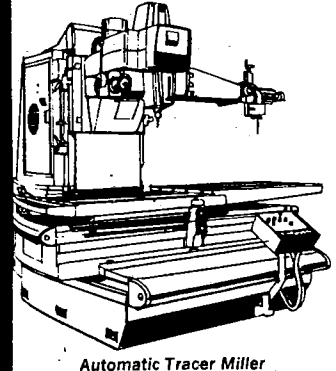
Hydraulic Tracer Miller



Automatic Tracer Miller



N/C Contour Miller



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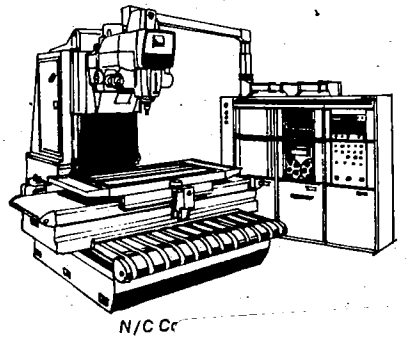


N/C Co

CIRCLE 55

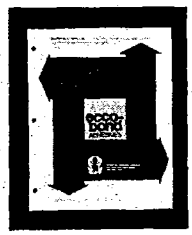
DSW 588096

STLCOPCB4093432

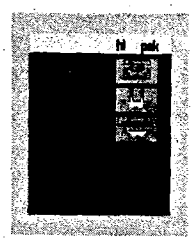
new literature



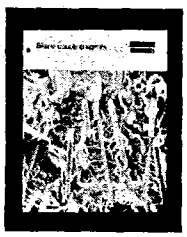
'Softpak' foam-molding machine brochure describes the processing capabilities of this fast-cycling unit for producing foam-packaging materials. A chart of cycle times reports the advantages of the process, which uses expanded polystyrene beads to produce soft hinged or flat packages for a variety of uses. Packaging Machinery Co., East Longmeadow, Mass. 01028. **335**



'Eccobond' adhesives. A four-page chart describes the adhesive line of this company and shows the physical, thermal and electrical properties of 17 products. Application photos and a general description of each material help designers to select the proper adhesive. The chart is suitable for wall display or notebook. Emerson & Cuming, Inc., Canton, Mass. 02021. **338**



Thermoform/fill/seal packaging machinery is the subject of an eight-page brochure. Basic functions (heating, forming, filling, lidding, sealing and cutoff) and options in two series of in-line packaging machines appear with machine specifications. Many examples of possible packages are illustrated. Filper Corp., 2411 Old Crow Canyon Rd., San Ramon, Calif. 94583. **341**



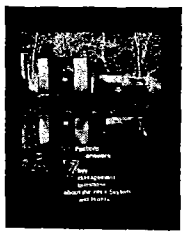
'Silane Coupling Agents', a 32-page booklet, presents the concept of chemically promoting the bond between organic and inorganic surfaces with silanes. This reference source includes functions, chemistry, mechanics and applications of silane coupling agents in filler-and-fibrous-reinforced plastics and all kinds of adhesive and coating applications. Dow Corning Corp., Midland, Mich. 48640. **336**



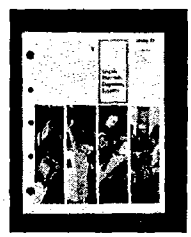
Motionless mixer that operates continuously with no moving parts is detailed in a four-page brochure. Specifications, features and operating principles of this ISG (Interfacial Surface Generator) mixer are illustrated with diagrams and tables. Technical information about selection and pressure drops also are charted. Charles Ross & Son Co., 710 Old Willets Path, Hauppauge, N.Y. 11787. **339**



'Hydra-Torque' all-hydraulic extruder. Design concept explanation and processing advantages for this new concept in extrusion are outlined in a four-page folder. Bulletin HTX-1 covers the operation, engineering features, sizes and drive characteristics of the unit. A schematic diagram elucidates the explanation. Extruders, Inc., 420 Cascade St., New Castle, Pa. 16101. **342**



'Fox 1' computer system for processing or energy control in the plastics and other industries is the subject of a 12-page booklet. Directed toward management personnel, the bulletin answers in nontechnical language typical questions about the system's operation, capabilities, reliability, profitability and integrity. The Foxboro Co., Dept. 120, Foxboro, Mass. 02035. **337**



Materials-dispensing equipment and systems are treated in a 40-page catalog. Catalog 43 provides detailed specifications for various pumps, couplings, valves and accessories. Actual applications are related and illustrated for spray, flow, transfer and measuring functions. Lincoln St. Louis, Div. of McNeil Corp., 4010 Goodfellow Blvd., St. Louis, Mo. 63120. **340**



Plastic filtration systems for extruders are presented in two four-page brochures. Emphasized is the "Con-Sta-Flo" automatic filter changer that claims noninterrupted flow of material and no air intake during screen or filter change. Diagrams show the operation of the equipment and specifications are given. C. J. Beringer Co., Inc., Box 97, Marblehead, Mass. 01945. **343**

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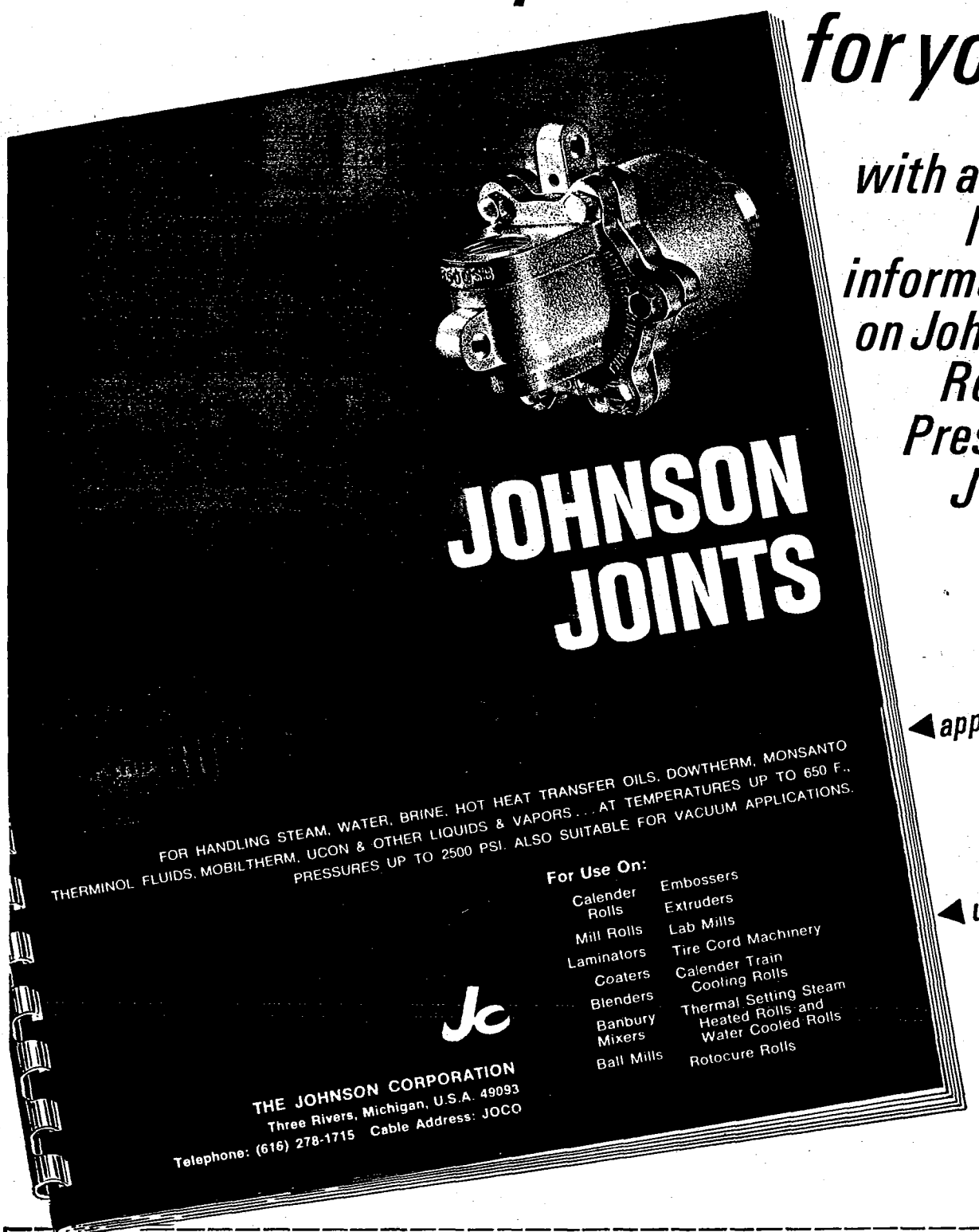
with all the latest information on Johnson Rotary Pressure Joints



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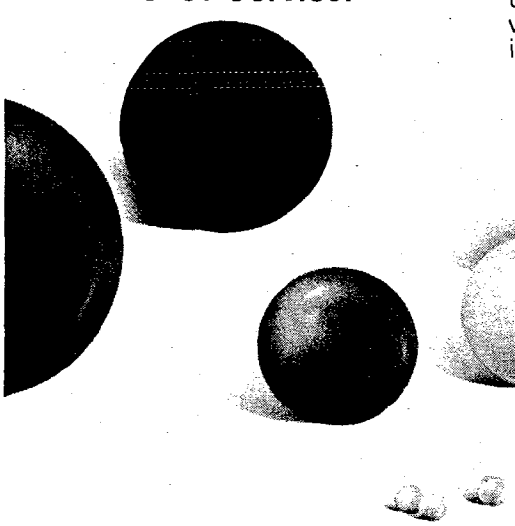
Plenco Melamine-Phenolics. Plenco Alkyds. Plenco Service.



The billiard ball, back in the middle of the last century, started the whole plastics industry rolling. With ivory in short supply, John Wesley Hyatt, one of the founders of Albany Plastic Company, Albany, N.Y., invented celluloid in 1868 and from it developed the world's first synthetic billiard ball.

Albany went on to become among the first custom molders of engineered plastics for industry. We're pleased that these innovators who know plastics so well, today choose Plenco thermoset compounds in producing their precision-ground balls for play and for work.

Truly balanced, controlled density balls. Void free and with a non-directional finish. In sizes ¼" to 3" in diameter. The thermosets selected: our Plenco 801 Melamine-Phenolic and Plenco 1505 Alkyd molding compounds. Their special properties, says Albany, of high impact strength, dimensional stability, low post molding shrinkage, chemical resistance, high specific gravity, compression strength, heat resistance, and maximum heat deflection temperature, are required in applications ranging from ball check valves and aircraft ball bearings to bearings for radar pivots.

Reports this molder: "Plenco's unusually fine salesengineers working closely with our organization, and the uniformity of material necessary for high quality production, makes these ball production applications successful." We will be happy to "play ball" with you, too.

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THERMOSET PLASTICS

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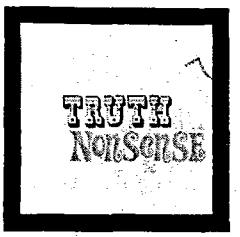
Sheboygan, Wisconsin 53081

Through Plenco research . . . a wide range of ready-made or custom-formulated phenolic, melamine, epoxy and alkyd thermoset molding compounds, and

CIRCLE 57

DSW 588099

new literature



'Truth and Nonsense' is a 12-page booklet about vinyl-foam carpet backings, especially the "ULOK" system using foamed-vinyl plastisol. The booklet also describes how the hot-melt process is compatible with the vinyl system. Union Carbide Corp., Chemical & Plastics Div., 270 Park Ave., New York, N.Y. 10017. **344**

Resins based on isophthalic acid. Four-page Bulletin IP-31 contains descriptions and tables of experimental procedures using isophthalic acid in low-profile glass-reinforced laminates. Amoco Chemicals Corp., 130 E. Randolph Dr., Chicago, Ill. 60601. **345**

'Banc-Lok' self-locking inserts for plastics are illustrated in an eight-page booklet. They are designed to take the place of molded-in inserts. Specifications as to material thickness, grip, hole size and thread size are provided. Boots Aircraft Nut Div., Townsend Co., 1230 E. Warner Ave., Santa Ana, Calif. 92707. **346**

Torsional braid analyzer for characterizing polymer systems is the subject of a four-page technical bulletin. The Model 100-B1 TBA generates data on transitions and transformations of polymers in terms of modulus and mechanical loss. The bulletin describes the machine's capabilities and accessories. Chemical Instruments Corp., 203-14 48th Ave., Bayside, N.Y. 00364. **347**

Research in the field of glass spheres in plastics is conducted at a laboratory described in a four-page brochure. Equipment designed to simulate compounding and molding conditions that test compounds for flow and molded pieces for physical properties is pictured. The brochure also outlines the research and development program and some recent progress in the field. Potters Industries, Inc., Box 14, Carlstadt, N. J. 07072. **348**

Standards for FEP plastic tubing. A voluntary product standard, PS 43-71, establishes dimensional and performance requirements for fluorinated ethylene propylene tubing intended for use as electrical insulation, in mechanical applications and in the transmission of fluids and gases. National Bureau of Standards, Washington, D. C. 20234. **349**

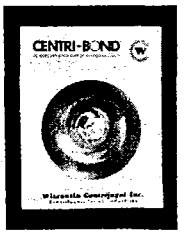
STLCOPCB4093435

Quartz heaters are discussed in a six-page booklet. "We've Improved on the Sun" gives the operating principles and advantages of quartz heaters. Ogden Sales, Inc., 2520 W. Irving Park Rd., Chicago, Ill. 60618. **350**

'Stor-A-Stak' pipe-supply system is the subject of a data sheet. The serpentine design of this vertical pipe stacker permits easy loading, rotating storage and accurate dispensing. Advantages are listed in the bulletin. Conco, Inc., Mendota, Ill. 61342. **351**

Allyl esters, cross-linking agents, acrylic and methacrylic chlorides and anhydrides are discussed in three data sheets. More than 150 polymer compounds are listed. Polysciences, Inc., Paul Valley Industrial Park, Warrington, Pa. 18976. **352**

'Hi-Lo' fastener for joining plastics and molded plastic parts is the subject of a four-page brochure. The fastening principle and key advantages are given. Central Screw Co., 2530 Crescent Dr., Broadview, Ill. 60153. **353**

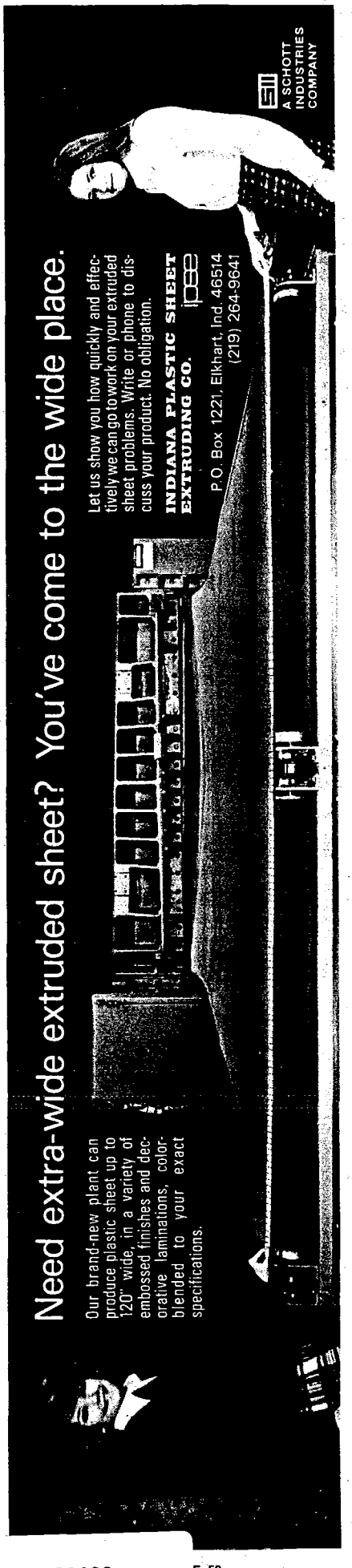


Bimetallic cylinders for manufacturing, pumping and conveying corrosive and abrasive plastics, chemicals, glass and synthetic fibers are the subject of a four-page bulletin. The "Centri-Bond" process for producing these is explained, and facilities for testing, machining, boring and fabricating are pictured. Wisconsin Centrifugal, Inc., Waukesha, Wis. 53186. **354**

Plastic pipe. Four publications offer engineering aids for designers and users of plastic pipe. Five nomographs for calculating plastic pipe weight comprise one item, and the other three are engineering manuals: "PVC Plastic Pipe for Water and Sewer Systems", "Flow of Fluids in PVC Plastic Pipe" and "Installation Manual for PVC in Water and Sewer Systems". Magadyne Industries, Ltd., Station L, Box 5620, Edmonton, Alberta, Canada. **355**



CIRCLE 58



DSW 588100

E 59

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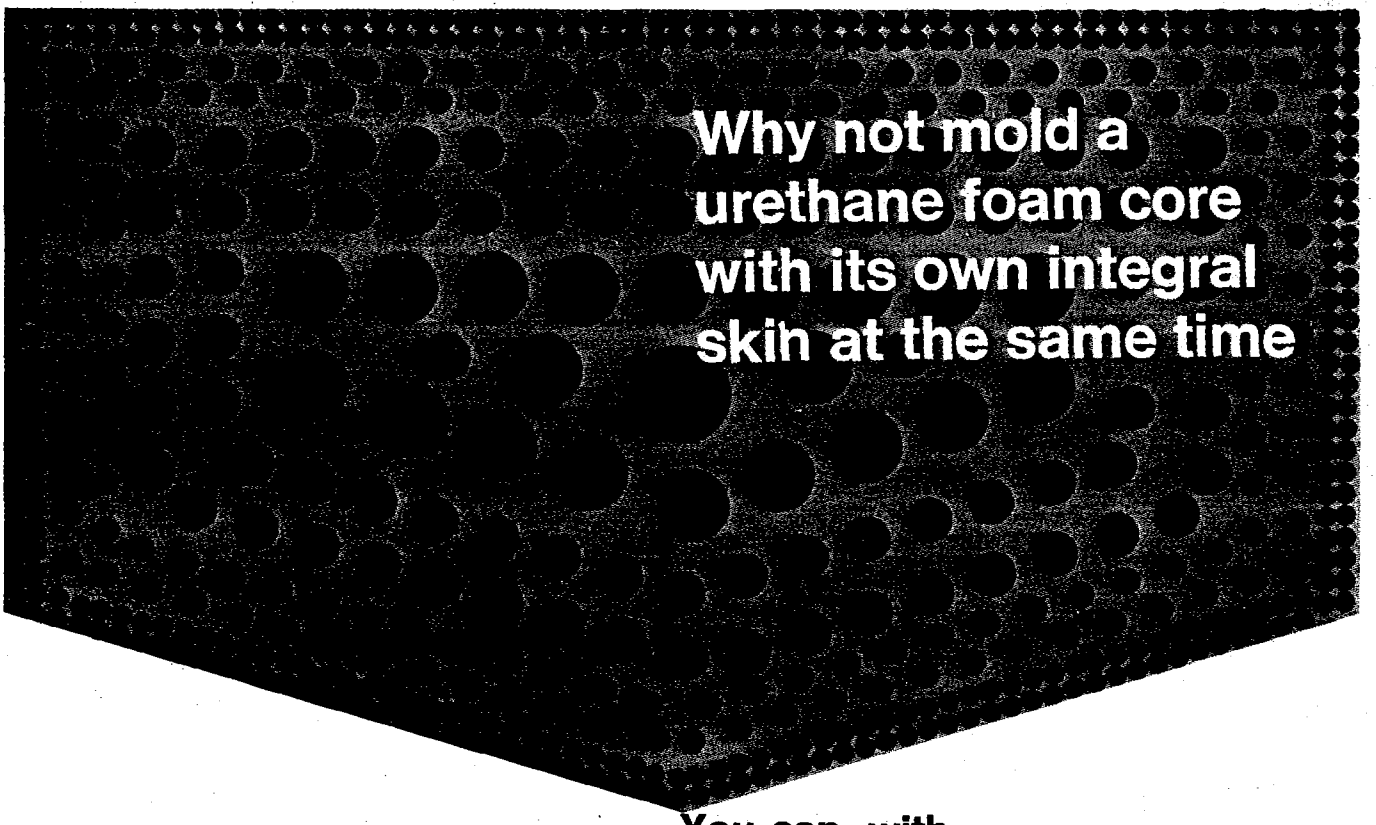
As long as you're using a foam core...



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In a matter of minutes you can produce a flexible, semi-rigid or rigid, continuous-integral-skinned urethane foam component, balanced to meet your requirements. The finished part will have all the pre-determined physical properties specified, such as the desired thickness and strength of the skin and the density, the flexibility or the rigidity of the core.

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CIRCLE 60

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new literature

Polymer grinders for the plastics industry are covered in an eight-page booklet. Engineering features, diagrams, dimensional drawings and technical specifications are provided for beside-the-press, heavy-duty central grinding and low-profile autofeed models for processing semiflexible and rigid materials. Polymer Machinery Corp., 60 Woodlawn Rd., Berlin, Conn. 06037. **362**



Cast-acrylic sheet. A brochure highlights current uses and new technology of acrylic thermoformed skins reinforced with fiber glass. Technical data and manufacturing applications are provided. Swedcast Div., Swedlow, Inc., 7350 Empire Dr., Florence, Ky. 41042. **363**

'Horse Head' titanium dioxide pigments for plastics are detailed in 15 data sheets. The sheets give application possibilities and such technical data as refractive index, particle size and various ASTM specifications. New Jersey Zinc Co., Box 248, Trenton, N. J. 08602. **364**

Plastic solids, slurries and viscous materials and ways to process them are discussed in a 20-page catalog of processing equipment. Coolers, heaters, dryers and agitators are included. The Bethlehem Corp., 225 W. Second St., Bethlehem, Pa. 18016. **365**



Accessory processing equipment such as granulators, dryers, pelletizers, loaders and blenders are depicted in a 12-page catalog. Specifications and capacities for models in each type of equipment are presented. Beloit Corp., Ball & Jewell Div., Downington, Pa. 19335. **366**

Diamond-coated steel tools for reinforced plastics are exhibited in a 24-page catalog. Products include saws, wheels, drills and miscellaneous tools. DiaChrome, Inc., 600 W. Elk Ave., Glendale, Calif. 91209. **367**

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$.02/lb.

That's what it costs to color your MARBON, UNIROYAL, MONSANTO or REXALL Natural ABS resin with Reed Color Concentrates. In fact, in some cases, the color cost is $.01/lb. We have matched every majors' standard colors and many of their custom colors.

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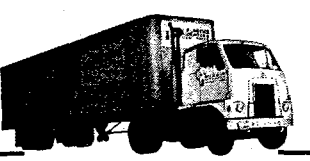

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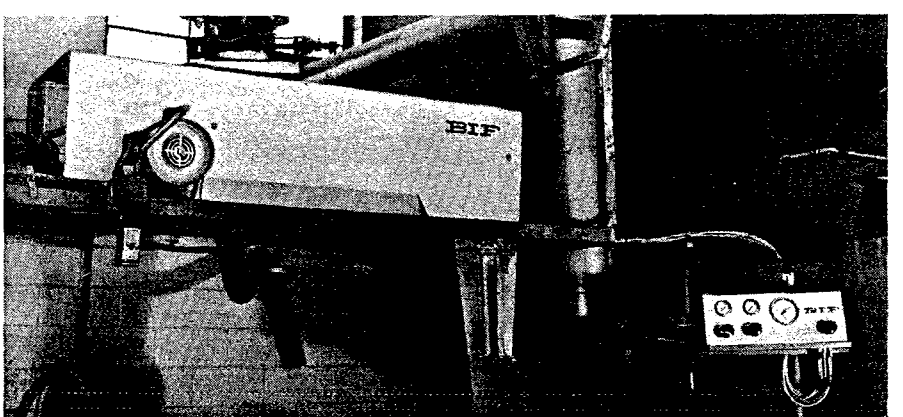

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SPRUANCE SOUTHERN, INC. WINSTON-SALEM, NO. CAROLINA

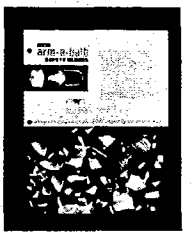
FINE FINISHES
Spruance

CIRCLE 63

new literature



'Eccofloat' syntactic foam materials are presented in a four-page chart. Technical details for seven series include information on use, forms available, buoyancy, strength and composition. Emerson & Cuming, Inc., Canton, Mass. 02021. **356**



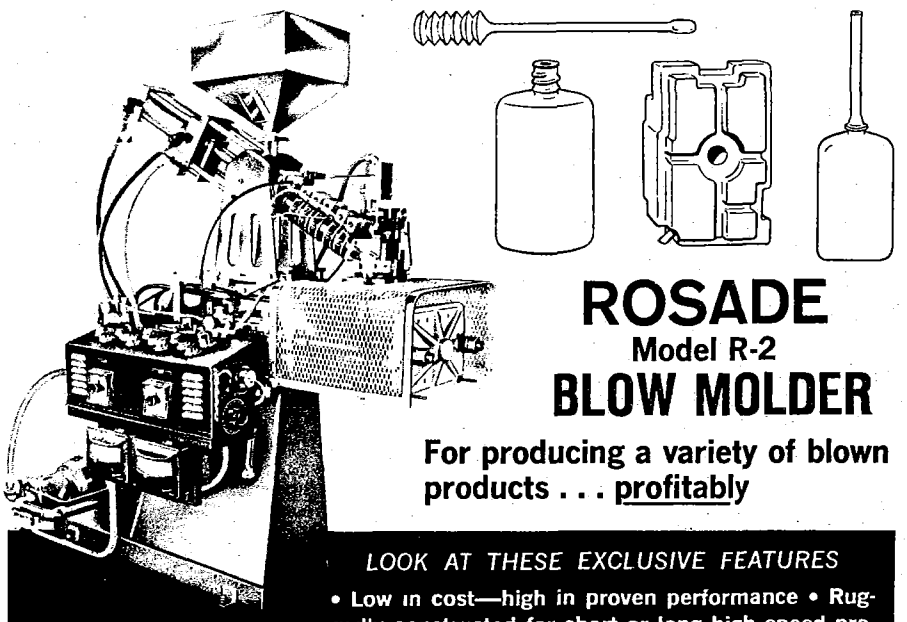
Custom extrusion. Three product bulletins showing safety globes for light bulbs, plastic fluorescent work lights and retractable nylon-coil air hoses show the processing capabilities of this custom extruder. Thermoplastic Processes, Inc., Valley Rd., Stirling, N. J. 07980. **359**

Saber saw for sheet materials is illustrated in a six-page folder. Special features of the saw include its adjustable stroke that enables the user to cut all types of materials completely supported at all points. The Cutawl Co., Bethel, Conn. 06801. **357**

Molded plastic products. A 20-page booklet graphically illustrates this company's involvement in the plastics industry. Topics covered are services, capabilities, facilities and know-how. USS Chemicals, Div. of United States Steel, Box 712, Chicago, Ill. 60690. **360**

Custom molding is the subject of an eight-page brochure. Services described are mold making, injection molding, compression molding, transfer molding and encapsulation. Whalite Mfg. Co., Rte. 202, Montville, N. J. 07045. **358**

Ball-check screw tips are described in a four-page bulletin. Three designs are illustrated and one is recommended for glass-filled materials. Erico Products, Inc., Plastics Equipment Div., 34600 Solon Rd., Cleveland, Ohio 44139. **361**



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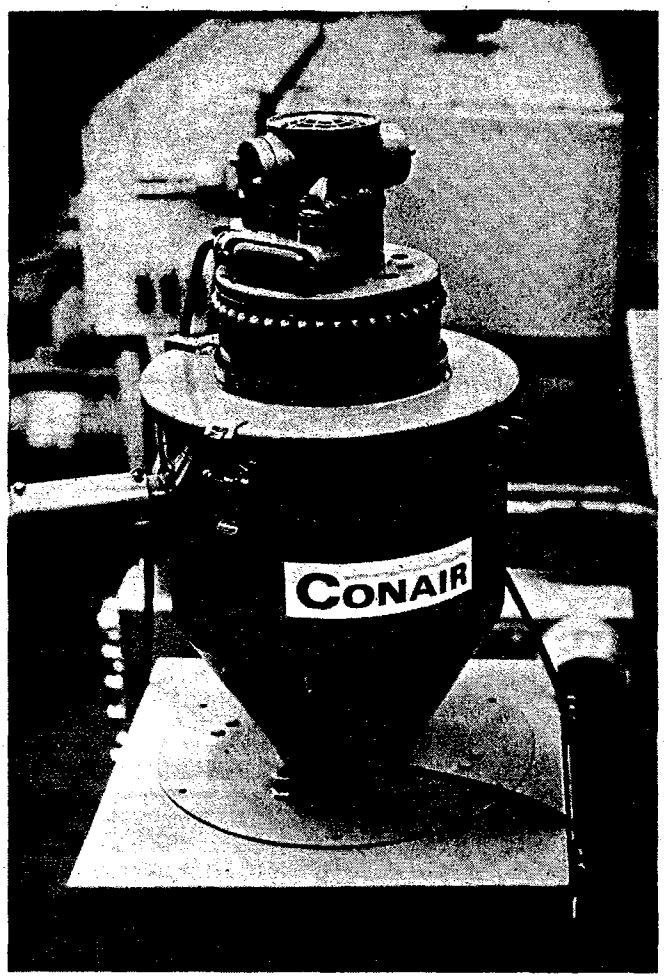

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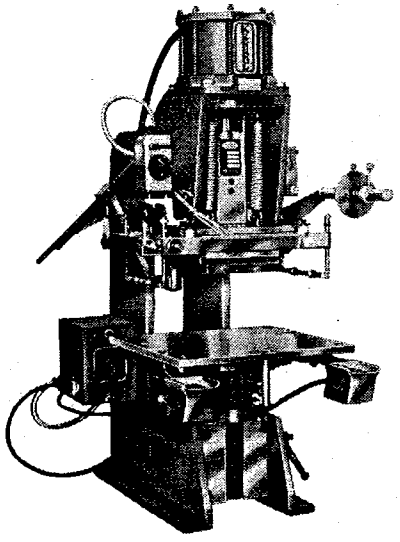

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Courses and Conferences

June 7-August 21—The 1971 Polymer and Materials Conference Series. Sponsor: The Division of Materials Science and Engineering, College of Engineering, University of Utah. Series consists of 10 distinct 1-week programs: "Fundamentals of Polymer Science and Engineering", "High-Temperature Polymers, Reinforcements and Composites", "Flammability Characteristics of Polymeric Materials", "Polymers: Permanent or Disposable?", "Adhesion", "The Role of Crystallinity in Governing Polymer Properties", "Organic Coating Technology", "Additives for Polymers", "Introduction to Materials Science and Engineering" and "Processing of Materials in Manufacturing Operations". At: The University of Utah, Salt Lake City, Utah. Fee for each course: $290. Contact: Mrs. Gaylene Bennion, Secretary, Polymer and Materials Conference, 2020 Merrill Engineering Bldg., University of Utah, Salt Lake City, Utah 84112.

June 7-June 25—The Polymer Conference Series. Sponsor: The Polymer Institute and College of Engineering, University of Detroit. Series consists of the remaining three (out of original seven) 1-week programs: "Flammability of Polymers", "Reinforcement of Polymers and Composite Structures" and "High-Temperature Polymers". At: University of Detroit, Detroit, Mich. Fee for each course: $265. Contact: Mrs. Shirley Lyons, Assistant Director of Polymer Conferences, Polymer Institute, University of Detroit, 4001 W. McNichols Rd., Detroit, Mich. 48221.

June 21-24—Fifth Temperature Symposium. Sponsor: The American Institute of Physics, The Instrument Society of America and The National Bureau of Standards. At: Sheraton Park Hotel, Washington, D. C. Fee: $30, members; $40, nonmembers. Contact: Vincent Giardina, Instrument Society of America, 400 Stanwix St., Pittsburgh, Pa. 15222.

June 24-25—PIB Seminar on "Packaging with Plastics. Sponsor: Polytechnic Institute of Brooklyn. At: Polytechnic Institute of Brooklyn, Brooklyn, N.Y. Fee: $50. Contact: Seminar Chairman, Prof. Paul Bruins, Polytechnic Institute of Brooklyn. 333 Jay St., Brooklyn, N.Y.

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Facts and Films

Plastics design—A special British Plastics publication entitled "Designing for Plastics Materials" describes the design criteria for specific plastics materials for engineering applications. Design fundamentals are considered from the standpoint of the basic mechanical properties of the materials. In addition, the specific physical properties that have a direct influence on processability, and therefore on mold and/or part design, are taken into account. Cost: $7.50/copy. British Plastics, IPC Business Press, Ltd., Box 147, 40 Bowling Green Lane, London, EC1 1DB, England.

"Plastics Education Guide"—This handbook was revised recently by the Plastics Education Foundation (cofounded by The Society of the Plastics Industry and The Society of Plastics Engineers) to help educational institutions and firms to prepare and present programs of study in plastics. It provides an indication of the various levels at which plastics can be taught, furnishes a comprehensive list of reference sources, describes trade associations that can assist in presenting programs, lists laboratory/testing and production equipment, and supplies a representative list of visual aids that can be used with plastics courses. Cost: $1, single copy; $0.60 each, 50 or more copies. Plastics Education Foundation, 656 W. Putnam Ave., Greenwich, Conn. 06830.

Literature translating service—Foreign-language editions of plastics industry literature, such as trade-show brochures, manuals, catalogs, proposals and annual reports, now can be obtained as a complete package service, including both language and graphic-arts capabilities. A new brochure describing the service is available. Write: Martin Roberts, Vice President, Linguistic Systems, Inc., 116 Austin St., Cambridge, Mass. 02139.

Plastics and electronics—Edited by Charles A. Harper, of Westinghouse Electric Corp., the "Handbook of Materials and Processes for Electronics" brings together needed basics and designs covering all types of electronic packages and assemblies. Of particular interest to the processor are extensive data and guidelines provided on all of the newer plastics. For example, practical data are given on the properties, processes and applications for all types of laminates, reinforced plastics and composite structures. Cost: $33.50. McGraw-Hill Book Co., 330 W. 42nd St., New York, N.Y. 10036.

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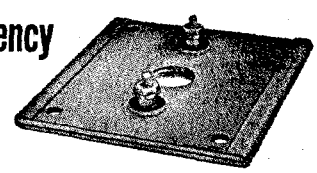

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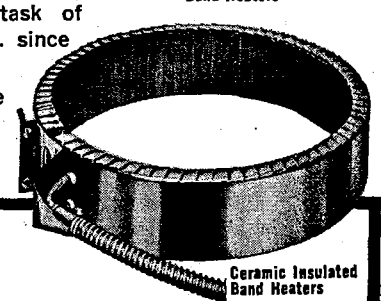

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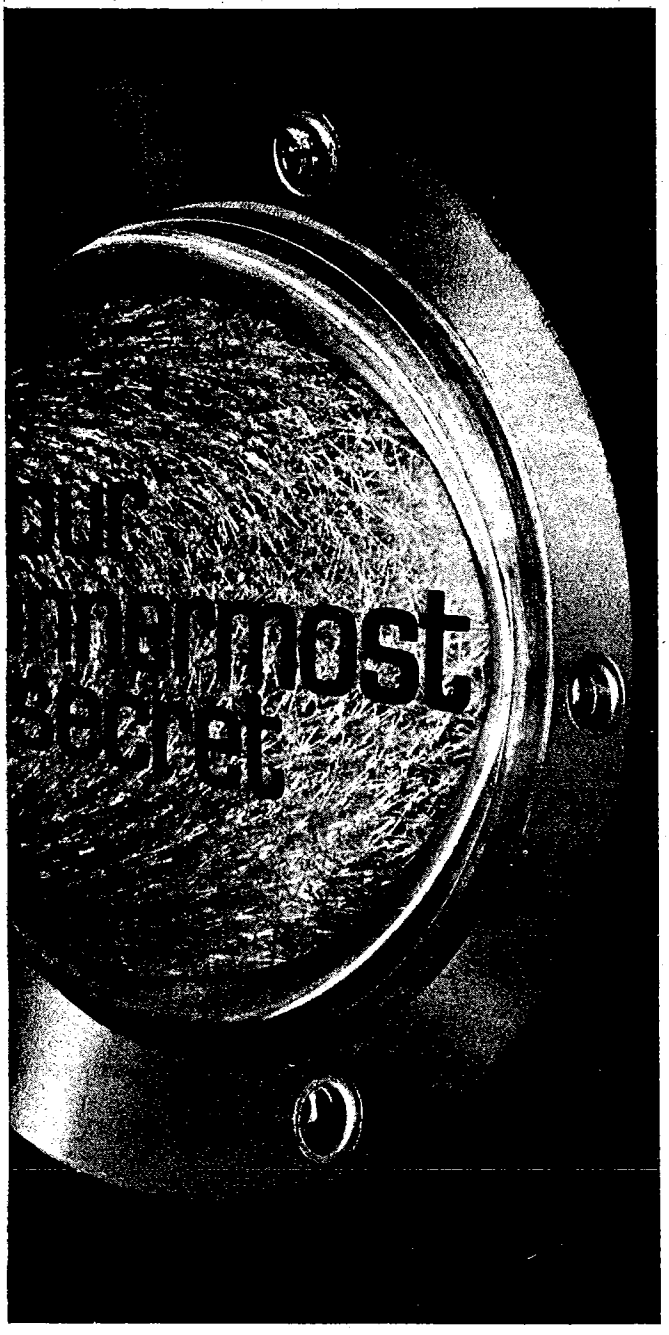

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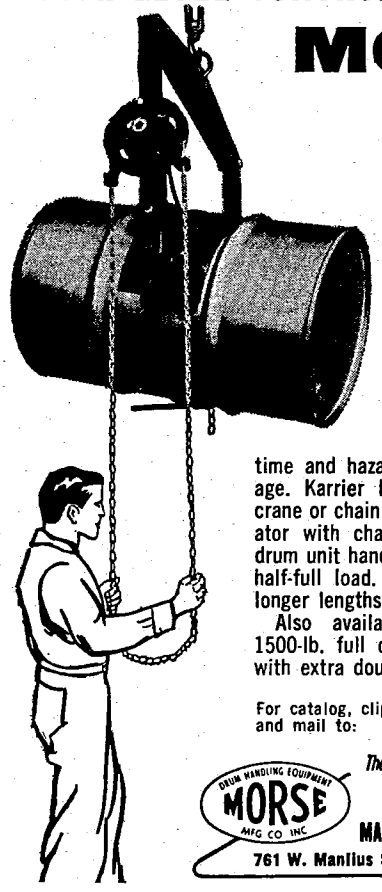

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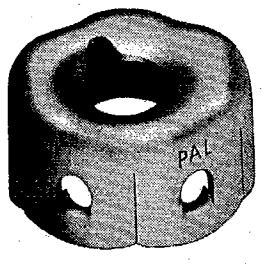

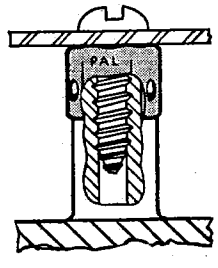

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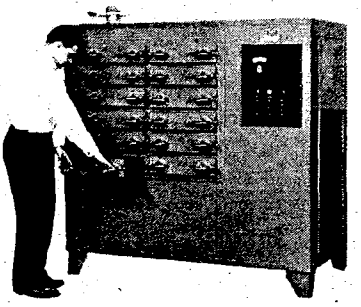

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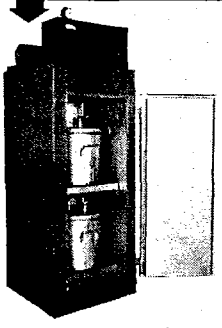

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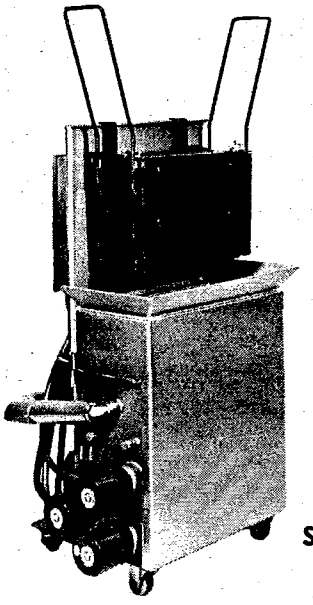

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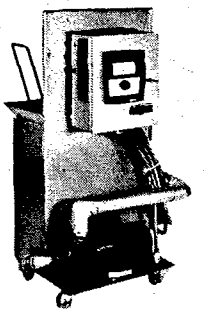

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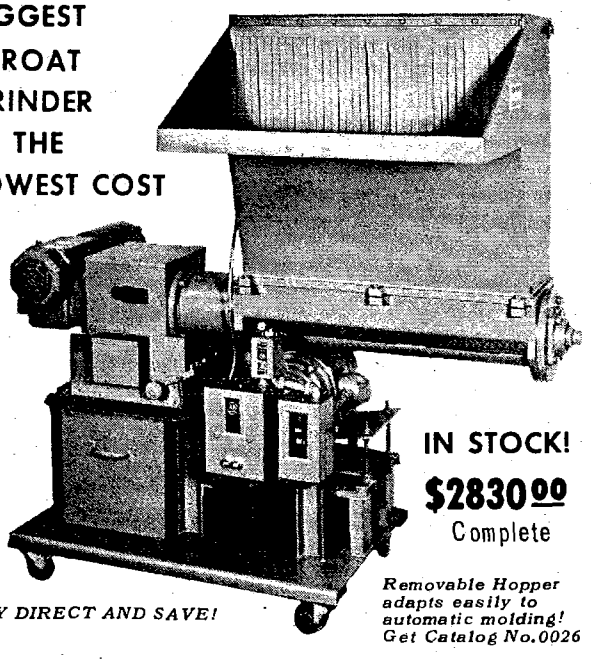

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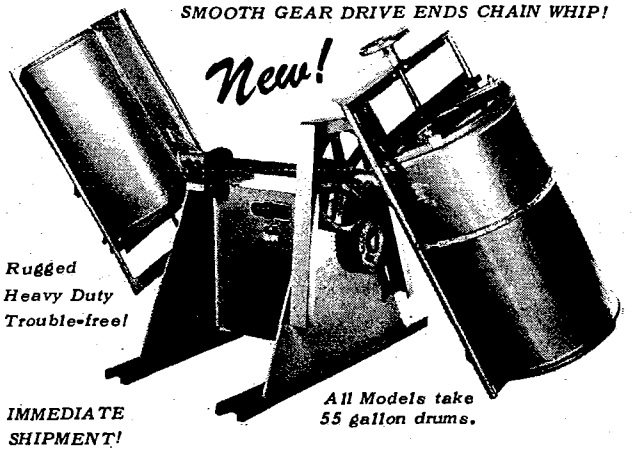

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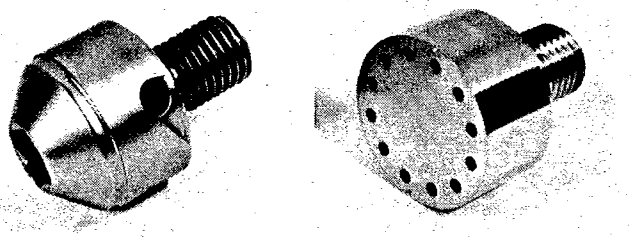

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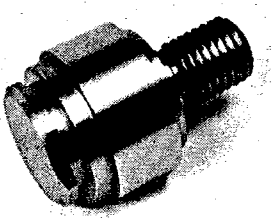

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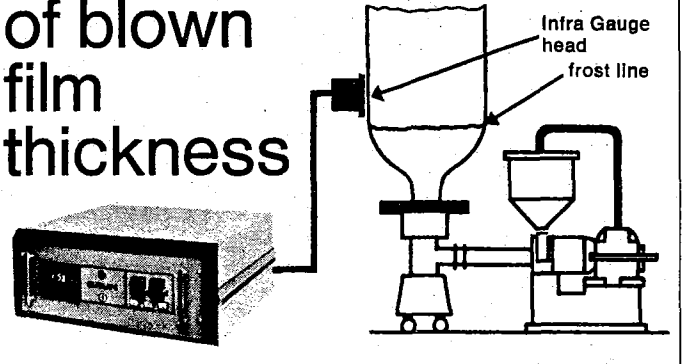

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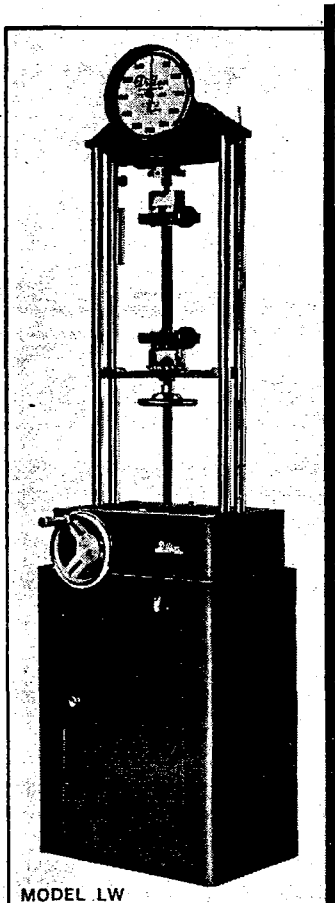

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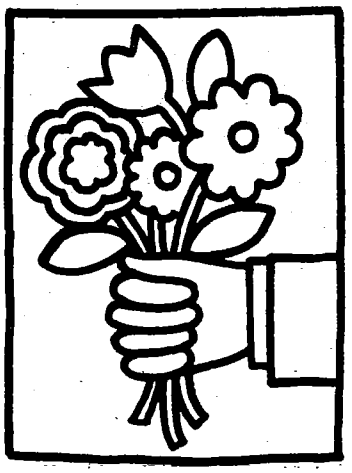

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For samples and data contact Dept. PW-671, Carey-Canadian Asbestos, Division of Panacon Corp., P.O. Box 15070, Cincinnati, Ohio 45215.

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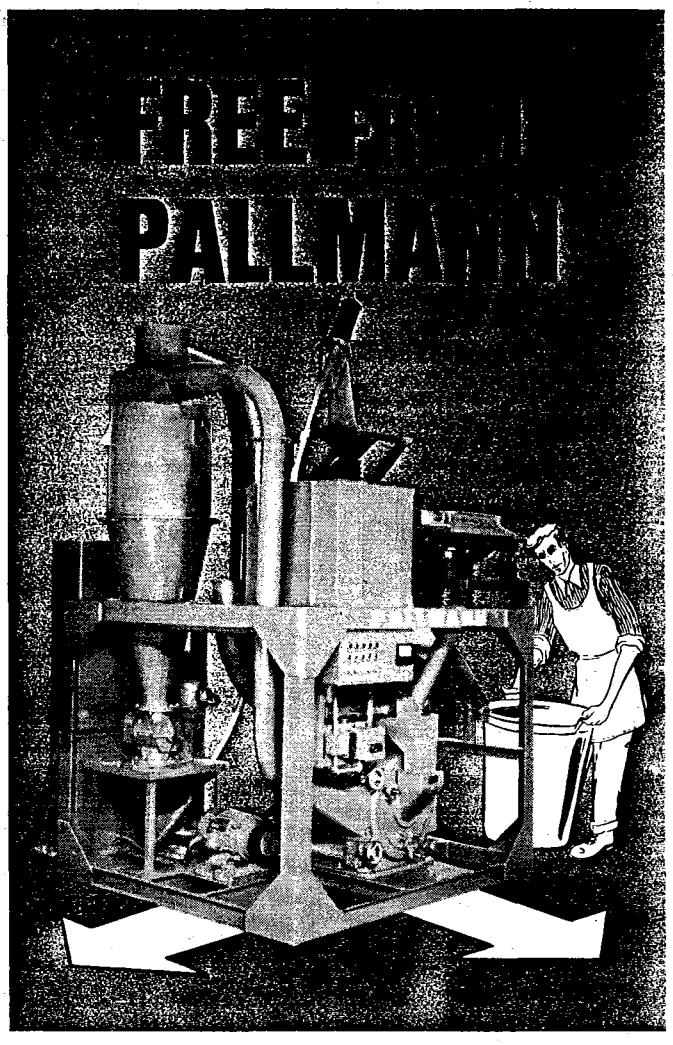

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advertisers' index

this issue, 62 175 copies

Accuratio Systems Inc. 121
Acromark Co. 109
Alpha Chemical & Plastics Corp. 120
Amoco Chemicals Corp., Plastics Div. . . . 18
Aquitaine Chemicals Inc. 113

BIF a unit of General Signal Corp. 111
Bipel International Inc. 83
Borg-Warner Corp.
Marbon Div. . . . . Cover II
Brabender, C. W., Instruments, Inc. 92
Brun Sensor Systems, Inc. 120

CIT Corp. 72
CPR Div., Upjohn Co. 110
Carey-Canadian Asbestos,
Div. of Panacon 121
Celanese Plastics Co. 13
Cincinnati Milacron Co., Plastics
Machinery Div. 8-9
Cities Service Co., Plastics Div. 66
Colt Industries, Crucible Specialty
Metals Div. 93
Conair, Inc. 113
Contour Chemical Co. 29
Cosden Oil & Chemical Co. . . . . Cover IV
Cumberland Engineering Co., Inc. 87

D-M-E Corp., Subs. of VSI Corp. 40
Darnell Corp., Ltd. 92
Day, J. H. Co. 26
Devcon Corp. 29
Diamond Shamrock Chemical Co. 36-37
Dillon, W. C. & Co., Inc. 121
Dow Corning Corp. 34
DuPont, E. I. de Nemours & Co., Inc. 22
Dusenbery, John, Co., Inc. 73

Eastman Chemical Products, Inc.
Plastics Div. 6-7
Edwards Engineering Corp. 88
Edwin L. Wiegand Div.,
Emerson Electric Co. 38

Fenwal Inc. Div.
Walter Kidde & Co., Inc. 19
Ferro Corp. 14-15
Foster Grant Co., Inc. 33

GAF Corp. 39
General Electric Co.,
Industry Control Dept. 98-99
Gentran Inc. 122
Gilbert Spruance Co. 112
Gorton Machine Corp., Subs. of
Kearney & Trecker Corp. 104-105

Hammond Plastics, Inc. 2
Hotwatt, Inc. 74

IMS Co. 97, 118, 119
Improved Machinery, Inc. 16
Indiana Plastic Sheet Extruding Co., A.
Schott Industries Co. 109
Industrial Heater Co., Inc. 115

Johnson Corp. 107
Judelshon, Oscar I., Inc. 22

Kensol-Olsenmark, Inc. 114
Kingsley Machine Co., Plastics Div. . . . 12

Lever Mfg. Corp. 29

3M Co., Nuclear Products 96
MG Welding Products
Div., MG Technical Products, Inc. 115
M&T Chemicals Inc. 91
Mearl Corp. 101
Mold Tech Div., Standard
International Corp. 116
Morse Mfg. Co., Inc. 116
Morton Chemical Co. 114
Moslo Machinery Co. 30

National Automatic Tool Co., Inc. 76
Nissei Plastic Industrial Co., Ltd. 35
Northern Natural Gas Co. 4

Pallmann Pulverizers Co., Inc. 122
Palnut Co., a United-Carr Div.,
TRW Inc. 116
Pangborn Div., Carborundum Co. 90
Plast-Data 17
Plastics Engineering Co. 108
Plastics World 17, 21, 65
Plastimation 35
Polymer Machinery Corp. . . . . 81, Cover III

Ram Chemicals 88
Reed Plastics Corp. 111
Reed-Prentice Div.,
Package Machinery Co. 89
Reichhold Chemicals, Inc. 20
Rocheleau Tool & Die Co., Inc. 112

Schulman, A., Inc. 57-64
Silmar Div., Vistron Corp. 25
Smooth-On, Inc. 74
Spruance Southern, Inc. 112

Toyota Motor Sales, U.S.A., Inc.
Industrial Equipment Div. 122
Tyco/Coating Products, Inc. 80

USM Corp.
Chemical Div. 1, 102-103
U.S.I. Chemicals Co. 100

Van Dorn Plastic Machinery Co. 94
Venus Products, Inc. 90
Vydax, DuPont,
E. I. de Nemours & Co., Inc. 22

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plastics world



John R. Lawrence, Editor

Let's make recycling honest

Every year millions of pounds of plastics materials are recycled to a useful need for one prime reason—economics. But in most cases this recycling is a hush-hush subject that processors are unwilling to talk about or even admit they do.

Why the secrecy?

Because some individuals have the impression, or want to create the impression, that if it isn't virgin, it isn't good.

There is a clear need to establish standards and legitimate uses for undefined mixtures of scrap plastics materials. How do you classify out-of-specification virgin material from a prime resin producer? What about trim, culls and sprues from molding and extrusion operations?

And what about standards for the largest potential of all, reclaimed material from its first useful life? This includes large volumes of packaging materials, insulation from reprocessed wire, recovered pipe and appliance housings, to name just a few.

The largest volume of reclaimed plastics now consists of out-of-specification production material from basic resin producers. It is estimated that 5 to 10 percent of all virgin resin falls into this category. Much of this material is especially formulated or blended with specification material to make top-quality resin for a specific application. However, because it is generally low in price, some of it is secretly blended into material going into products calling for specification, virgin resin. Often no one but the molder ever knows about such dishonest practice.

It is our recommendation that a new activity be organized within SPI. This activity might be called the Plastics Recycling Institute. The purpose of this institute would be to:

Establish standards for various grades of materials for recycling.

Establish testing procedures to characterize materials for recycling.

Establish the suitability of using recycled material for certain types of applications.

Establish a technique of reporting on inventories of materials for recycling so as to correlate the volume of these materials with the volume and price of virgin materials.

Most materials industries have some type of organized recycling program that recognizes the economic, conservation and antipollution aspects of recycling. This is not so with the plastics industry.

In a recent study conducted for a government agency on plastics scrap and recycling, it was reported that there is no organized program nor any industry standards for plastics scrap. This report further recommended that the government consider organizing such a program if the industry does not do so.

Now is a most appropriate time for the plastics industry to establish its own recycling program. We must recognize where there is economic validity in recycling plastics and do it on an open, organized and honest basis.

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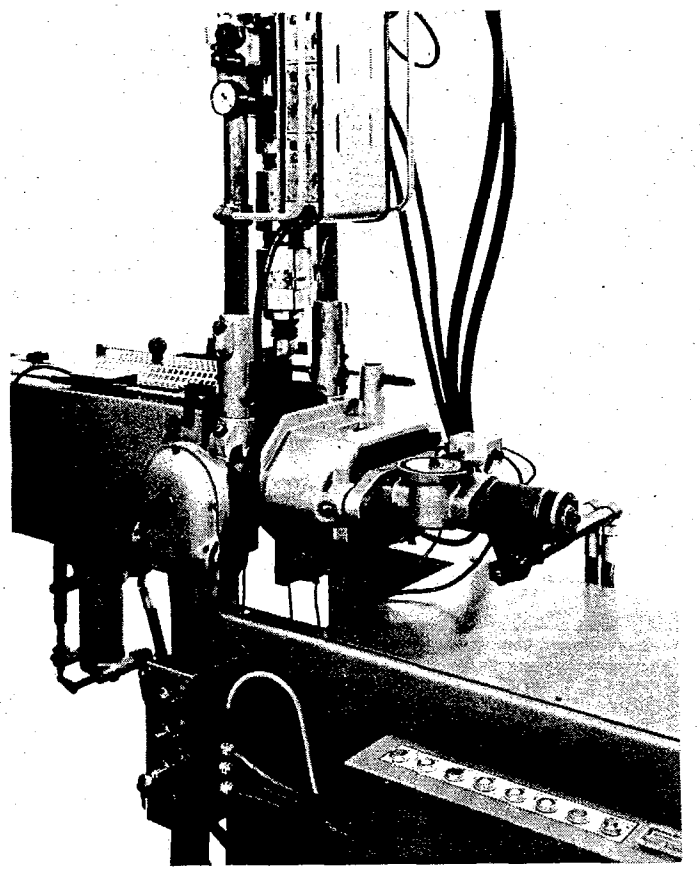

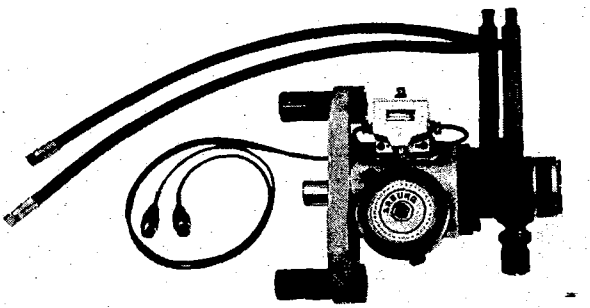

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2 oz. capacity in-line screw
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Stroke: 7.8"
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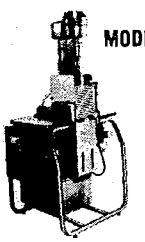
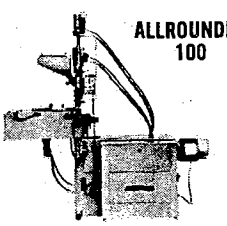
OTHER ARBURG MODELS *Recognized as LEADERS in automatic production of close-tolerance parts.*

MODEL C4b



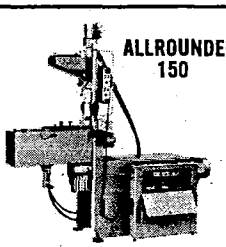
.3 oz. (10 grams) plunger type with 5.5 ton clamp, air operated; shut-off nozzle, photo cell recycling, auto-temp. controls timing and feeding. Excellent for small, close tolerance parts.

ALLROUNDER 100



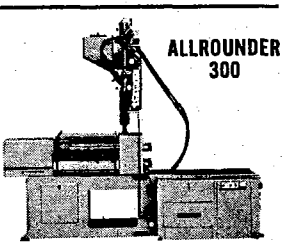
.6 oz. (18 grams) in-line screw, 22,100 psi injection pressure, 13 ton toggle clamp, hydraulic screw up to 450 rpm. 4" x 5" mold, 5.5" stroke. Vertical or horizontal clamp and injection. Solid state, complete automation.

ALLROUNDER 150



1 oz. (28 grams) in-line screw, 21,300 psi injection pressure, 24 ton toggle clamp, hydraulic screw up to 250 rpm. 6" x 8" mold, 6.625" stroke. Vertical or horizontal clamp and injection. Can also mold 2 colors.

ALLROUNDER 300



5 oz. (145 grams) in-line screw, 21,500 psi inj. press., 88 ton toggle clamp. Unique hyd. screw drive (up to 260 rpm) increases torque as melt viscosity increases. 11.8"x14" mold. 9.8" stroke. Fixed horiz. clamp injection: horiz. or vert. 2-color also.

Write for new 12-page brochure giving detailed specifications. All machines available for demonstration.

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CIRCLE 87

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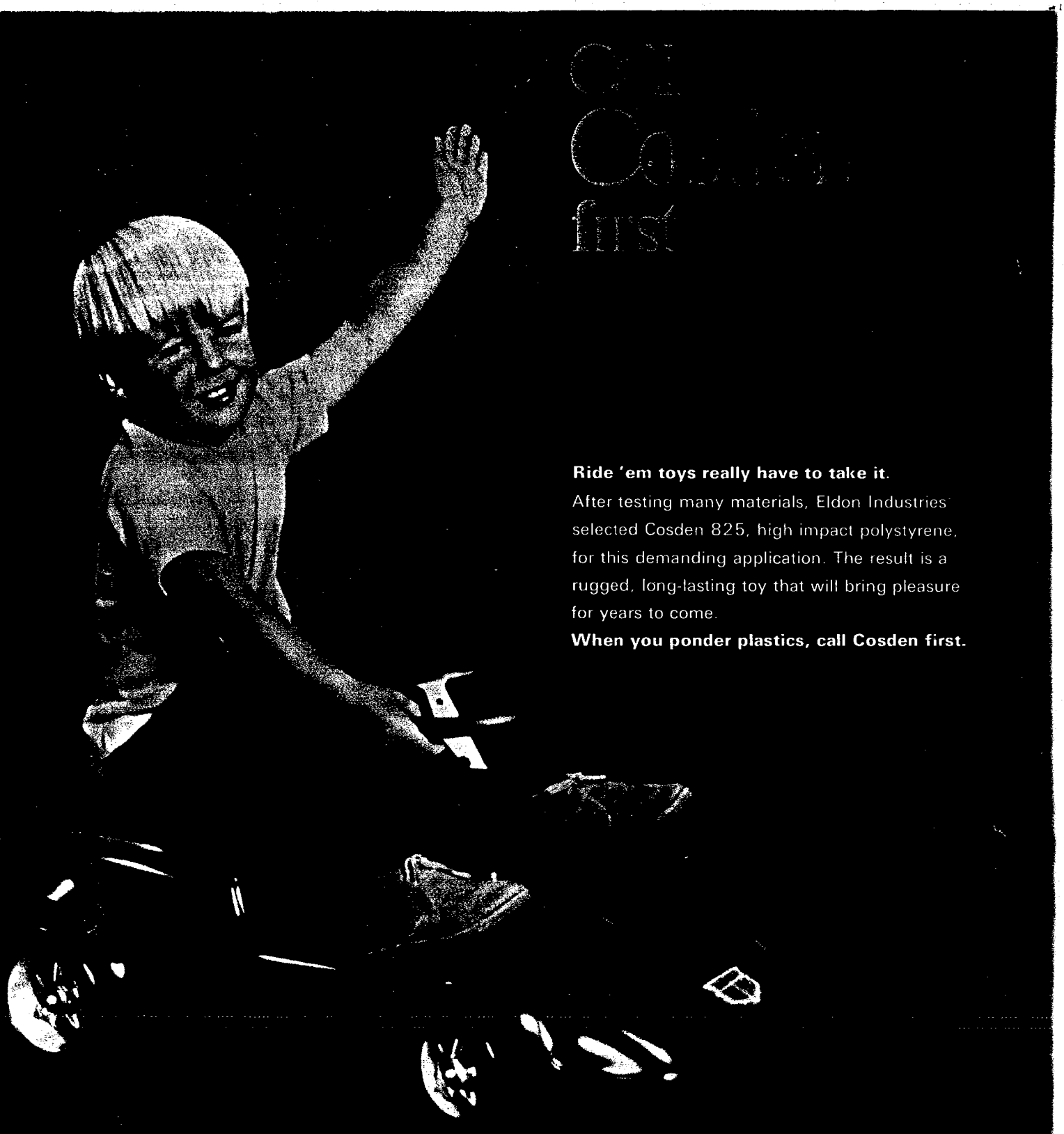

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CIRCLE 88

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